INSTALLATION AND OPERATION MANUAL

Optimux-34

Fiber Optic Multiplexer

Version 2.81

RAD
data communications
The Access Company

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Installation and Operation Manual

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RAD warrants to DISTRIBUTOR that the hardware in the Optimux-34 to be delivered hereunder shall be free of defects in material and workmanship under normal use and service for a period of twelve (12) months following the date of shipment to DISTRIBUTOR.

If, during the warranty period, any component part of the equipment becomes defective by reason of material or workmanship, and DISTRIBUTOR immediately notifies RAD of such defect, RAD shall have the option to choose the appropriate corrective action: a) supply a replacement part, or b) request return of equipment to its plant for repair, or c) perform necessary repair at the equipment's location. In the event that RAD requests the return of equipment, each party shall pay one-way shipping costs.

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Product Disposal

To facilitate the reuse, recycling and other forms of recovery of waste equipment in protecting the environment, the owner of this RAD product is required to refrain from disposing of this product as unsorted municipal waste at the end of its life cycle. Upon termination of the unit's use, customers should provide for its collection for reuse, recycling or other form of environmentally conscientious disposal.

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

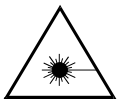
Safety Symbols

Warning

This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

Protective ground: the marked lug or terminal should be connected to the building protective ground bus.



Warning

Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached.

Please observe the following precautions:

- Before turning on the equipment, make sure that the fiber optic cable is intact and is connected to the transmitter.
- Do not attempt to adjust the laser drive current.
- Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.
- The use of optical devices with the equipment will increase eye hazard.
- Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.

ATTENTION: The laser beam may be invisible!

In some cases, the users may insert their own SFP laser transceivers into the product. Users are alerted that RAD cannot be held responsible for any damage that may result if non-compliant transceivers are used. In particular, users are warned to use only agency approved products that comply with the local laser safety regulations for Class 1 laser products.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

Handling Energized Products

General Safety Practices

Do not touch or tamper with the power supply when the power cord is connected. Line voltages may be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective ground terminal. If a ground lug is provided on the product, it should be connected to the protective ground at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in grounded racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Some products may have panels secured by thumbscrews with a slotted head. These panels may cover hazardous circuits or parts, such as power supplies. These thumbscrews should therefore always be tightened securely with a screwdriver after both initial installation and subsequent access to the panels.

Connecting AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A (20A for USA and Canada). The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A (40A for USA and Canada).

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

In cases when the power distribution system is IT type, the switch must disconnect both poles simultaneously.

Connecting DC Power

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC power systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

Make sure that the DC power supply is electrically isolated from any AC source and that the installation complies with the local codes.

The maximum permissible current capability of the branch distribution circuit that supplies power to the product is 16A (20A for USA and Canada). The circuit breaker in the building installation should have high breaking capacity and must operate at short-circuit current exceeding 35A (40A for USA and Canada).

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

If the DC power supply is floating, the switch must disconnect both poles simultaneously.

Connecting Data and Telecommunications Cables

Data and telecommunication interfaces are classified according to their safety status.

The following table lists the status of several standard interfaces. If the status of a given port differs from the standard one, a notice will be given in the manual.

Ports	Safety Status	
V.11, V.28, V.35, V.36, RS-530, X.21, 10 BaseT, 100 BaseT, Unbalanced E1, E2, E3, STM, DS-2, DS-3, S-Interface ISDN, Analog voice E&M	SELV	Safety Extra Low Voltage: Ports which do not present a safety hazard. Usually up to 30 VAC or 60 VDC.
xDSL (without feeding voltage), Balanced E1, T1, Sub E1/T1	TNV-1	Telecommunication Network Voltage-1: Ports whose normal operating voltage is within the limits of SELV, on which overvoltages from telecommunications networks are possible.
FXS (Foreign Exchange Subscriber)	TNV-2	Telecommunication Network Voltage-2: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are not possible. These ports are not permitted to be directly connected to external telephone and data lines.
FXO (Foreign Exchange Office), xDSL (with feeding voltage), U-Interface ISDN	TNV-3	Telecommunication Network Voltage-3: Ports whose normal operating voltage exceeds the limits of SELV (usually up to 120 VDC or telephone ringing voltages), on which overvoltages from telecommunication networks are possible.

Always connect a given port to a port of the same safety status. If in doubt, seek the assistance of a qualified safety engineer.

Always make sure that the equipment is grounded before connecting telecommunication cables. Do not disconnect the ground connection before disconnecting all telecommunications cables.

Some SELV and non-SELV circuits use the same connectors. Use caution when connecting cables. Extra caution should be exercised during thunderstorms.

When using shielded or coaxial cables, verify that there is a good ground connection at both ends. The grounding and bonding of the ground connections should comply with the local codes.

The telecommunication wiring in the building may be damaged or present a fire hazard in case of contact between exposed external wires and the AC power lines. In order to reduce the risk, there are restrictions on the diameter of wires in the telecom cables, between the equipment and the mating connectors.

Caution To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cords.

Attention Pour réduire les risques s'incendie, utiliser seulement des conducteurs de télécommunications 26 AWG ou de section supérieure.

Some ports are suitable for connection to intra-building or non-exposed wiring or cabling only. In such cases, a notice will be given in the installation instructions.

Do not attempt to tamper with any carrier-provided equipment or connection hardware.

Electromagnetic Compatibility (EMC)

The equipment is designed and approved to comply with the electromagnetic regulations of major regulatory bodies. The following instructions may enhance the performance of the equipment and will provide better protection against excessive emission and better immunity against disturbances.

A good ground connection is essential. When installing the equipment in a rack, make sure to remove all traces of paint from the mounting points. Use suitable lock-washers and torque. If an external grounding lug is provided, connect it to the ground bus using braided wire as short as possible.

The equipment is designed to comply with EMC requirements when connecting it with unshielded twisted pair (UTP) cables. However, the use of shielded wires is always recommended, especially for high-rate data. In some cases, when unshielded wires are used, ferrite cores should be installed on certain cables. In such cases, special instructions are provided in the manual.

Disconnect all wires which are not in permanent use, such as cables used for one-time configuration.

The compliance of the equipment with the regulations for conducted emission on the data lines is dependent on the cable quality. The emission is tested for UTP with 80 dB longitudinal conversion loss (LCL).

Unless otherwise specified or described in the manual, TNV-1 and TNV-3 ports provide secondary protection against surges on the data lines. Primary protectors should be provided in the building installation.

The equipment is designed to provide adequate protection against electro-static discharge (ESD). However, it is good working practice to use caution when connecting cables terminated with plastic connectors (without a grounded metal hood, such as flat cables) to sensitive data lines. Before connecting such cables, discharge yourself by touching ground or wear an ESD preventive wrist strap.

FCC-15 User Information

This equipment has been tested and found to comply with the limits of the Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the Installation and Operation manual, may cause harmful interference to the radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Canadian Emission Requirements

This Class A digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Warning per EN 55022 (CISPR-22)

Warning	This is a class A product. In a domestic environment, this product may cause radio interference, in which case the user will be required to take adequate measures.
Avertissement	Cet appareil est un appareil de Classe A. Dans un environnement résidentiel, cet appareil peut provoquer des brouillages radioélectriques. Dans ces cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.
Achtung	Das vorliegende Gerät fällt unter die Funkstörgrenzwertklasse A. In Wohngebieten können beim Betrieb dieses Gerätes Rundfunkströrungen auftreten, für deren Behebung der Benutzer verantwortlich ist.

Mise au rebut du produit

Afin de faciliter la réutilisation, le recyclage ainsi que d'autres formes de récupération d'équipement mis au rebut dans le cadre de la protection de l'environnement, il est demandé au propriétaire de ce produit RAD de ne pas mettre ce dernier au rebut en tant que déchet municipal non trié, une fois que le produit est arrivé en fin de cycle de vie. Le client devrait proposer des solutions de réutilisation, de recyclage ou toute autre forme de mise au rebut de cette unité dans un esprit de protection de l'environnement, lorsqu'il aura fini de l'utiliser.

Instructions générales de sécurité

Les instructions suivantes servent de guide général d'installation et d'opération sécurisées des produits de télécommunications. Des instructions supplémentaires sont éventuellement indiquées dans le manuel.

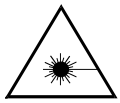
Symboles de sécurité

Avertissement

Ce symbole peut apparaitre sur l'équipement ou dans le texte. Il indique des risques potentiels de sécurité pour l'opérateur ou le personnel de service, quant à l'opération du produit ou à sa maintenance.

Danger de choc électrique ! Evitez tout contact avec la surface marquée tant que le produit est sous tension ou connecté à des lignes externes de télécommunications.

Mise à la terre de protection : la cosse ou la borne marquée devrait être connectée à la prise de terre de protection du bâtiment.



Avertissement

Certains produits peuvent être équipés d'une diode laser. Dans de tels cas, une étiquette indiquant la classe laser ainsi que d'autres avertissements, le cas échéant, sera jointe près du transmetteur optique. Le symbole d'avertissement laser peut aussi être joint.

Veuillez observer les précautions suivantes :

- Avant la mise en marche de l'équipement, assurez-vous que le câble de fibre optique est intact et qu'il est connecté au transmetteur.
- Ne tentez pas d'ajuster le courant de la commande laser.
- N'utilisez pas des câbles ou connecteurs de fibre optique cassés ou sans terminaison et n'observez pas directement un rayon laser.
- L'usage de périphériques optiques avec l'équipement augmentera le risque pour les yeux.
- L'usage de contrôles, ajustages ou procédures autres que celles spécifiées ici pourrait résulter en une dangereuse exposition aux radiations.

ATTENTION : Le rayon laser peut être invisible !

Les utilisateurs pourront, dans certains cas, insérer leurs propres émetteurs-récepteurs Laser SFP dans le produit. Les utilisateurs sont avertis que RAD ne pourra pas être tenue responsable de tout dommage pouvant résulter de l'utilisation d'émetteurs-récepteurs non conformes. Plus particulièrement, les utilisateurs sont avertis de n'utiliser que des produits approuvés par l'agence et conformes à la réglementation locale de sécurité laser pour les produits laser de classe 1.

Respectez toujours les précautions standards de sécurité durant l'installation, l'opération et la maintenance de ce produit. Seul le personnel de service qualifié et autorisé devrait effectuer l'ajustage, la maintenance ou les réparations de ce produit. Aucune opération d'installation, d'ajustage, de maintenance ou de réparation ne devrait être effectuée par l'opérateur ou l'utilisateur.

Manipuler des produits sous tension

Règles générales de sécurité

Ne pas toucher ou altérer l'alimentation en courant lorsque le câble d'alimentation est branché. Des tensions de lignes peuvent être présentes dans certains produits, même lorsque le commutateur (s'il est installé) est en position OFF ou si le fusible est rompu. Pour les produits alimentés par CC, les niveaux de tension ne sont généralement pas dangereux mais des risques de courant peuvent toujours exister.

Avant de travailler sur un équipement connecté aux lignes de tension ou de télécommunications, retirez vos bijoux ou tout autre objet métallique pouvant venir en contact avec les pièces sous tension.

Sauf s'il en est autrement indiqué, tous les produits sont destinés à être mis à la terre durant l'usage normal. La mise à la terre est fournie par la connexion de la fiche principale à une prise murale équipée d'une borne protectrice de mise à la terre. Si une cosse de mise à la terre est fournie avec le produit, elle devrait être connectée à tout moment à une mise à la terre de protection par un conducteur de diamètre 18 AWG ou plus. L'équipement monté en châssis ne devrait être monté que sur des châssis et dans des armoires mises à la terre.

Branchez toujours la mise à la terre en premier et débranchez-la en dernier. Ne branchez pas des câbles de télécommunications à un équipement qui n'est pas mis à la terre. Assurez-vous que tous les autres câbles sont débranchés avant de déconnecter la mise à la terre.

Connexion au courant du secteur

Assurez-vous que l'installation électrique est conforme à la réglementation locale.

Branchez toujours la fiche de secteur à une prise murale équipée d'une borne protectrice de mise à la terre.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A (20A aux Etats-Unis et Canada). Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A (40A aux Etats-Unis et Canada).

Branchez toujours le câble d'alimentation en premier à l'équipement puis à la prise murale. Si un commutateur est fourni avec l'équipement, fixez-le en position OFF. Si le câble d'alimentation ne peut pas être facilement débranché en cas d'urgence, assurez-vous qu'un coupe-circuit ou un disjoncteur d'urgence facilement accessible est installé dans l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si le système de distribution de courant est de type IT.

Connexion d'alimentation CC

Sauf s'il en est autrement spécifié dans le manuel, l'entrée CC de l'équipement est flottante par rapport à la mise à la terre. Tout pôle doit être mis à la terre en externe.

A cause de la capacité de courant des systèmes à alimentation CC, des précautions devraient être prises lors de la connexion de l'alimentation CC pour éviter des courts-circuits et des risques d'incendie.

Assurez-vous que l'alimentation CC est isolée de toute source de courant CA (secteur) et que l'installation est conforme à la réglementation locale.

La capacité maximale permissible en courant du circuit de distribution de la connexion alimentant le produit est de 16A (20A aux Etats-Unis et Canada). Le coupe-circuit dans l'installation du bâtiment devrait avoir une capacité élevée de rupture et devrait fonctionner sur courant de court-circuit dépassant 35A (40A aux Etats-Unis et Canada).

Avant la connexion des câbles d'alimentation en courant CC, assurez-vous que le circuit CC n'est pas sous tension. Localisez le coupe-circuit dans le tableau desservant l'équipement et fixez-le en position OFF. Lors de la connexion de câbles d'alimentation CC, connectez d'abord le conducteur de mise à la terre à la borne correspondante, puis le pôle positif et en dernier, le pôle négatif. Remettez le coupe-circuit en position ON.

Un disjoncteur facilement accessible, adapté et approuvé devrait être intégré à l'installation du bâtiment.

Le disjoncteur devrait déconnecter simultanément les deux pôles si l'alimentation en courant CC est flottante.

Glossary

Address	A coded representation of the origin or destination of data.
Agent	In SNMP, this refers to the managed system.
Attenuation	Signal power loss through equipment, lines or other transmission devices. Measured in decibels.
Balanced	A transmission line in which voltages on the two conductors are equal in magnitude, but opposite in polarity, with respect to ground.
Bandwidth	The range of frequencies passing through a given circuit. The greater the bandwidth, the more information can be sent through the circuit in a given amount of time.
Baud	Unit of signaling speed equivalent to the number of discrete conditions or events per second. If each signal event represents only one bit condition, baud rate equals bps (bits per second).
Bit	The smallest unit of information in a binary system. Represents either a one or zero ("1" or "0").
Bridge	A device interconnecting local area networks at the OSI data link layer, filtering and forwarding frames according to media access control (MAC) addresses.
Byte	A group of bits (normally 8 bits in length).
Carrier	A continuous signal at a fixed frequency that is capable of being modulated with a second (information carrying) signal.
Cell	The 53-byte basic information unit within an ATM network. The user traffic is segmented into cells at the source and reassembled at the destination. An ATM cell consists of a 5-byte ATM header and a 48-byte ATM payload, which contains the user data.
Channel	A path for electrical transmission between two or more points. Also called a link, line, circuit or facility.
Clock	A term for the source(s) of timing signals used in synchronous transmission.
Control Signals	Signals passing between one part of a communications system and another (such as RTS, DTR, or DCD), as part of a mechanism for controlling the system.
Data	Information represented in digital form, including voice, text, facsimile and video.
dBm	A measure of power in communications: the decibel in reference to one milliwatt (0 dBm = 1 milliwatt and -30 dBm = .001 milliwatt).
Diagnostics	The detection and isolation of a malfunction or mistake in a communications device, network or system.

E1 Line	A 2.048 Mbps line, common in Europe, that supports thirty-two 64 kbps channels, each of which can transmit and receive data or digitized voice. The line uses framing and signaling to achieve synchronous and reliable transmission. The most common configurations for E1 lines are E1 PRI, and unchannelized E1.
E3	The European standard for high speed digital transmission, operating at 34 Mbps.
Encapsulation	Encapsulating data is a technique used by layered protocols in which a low level protocol accepts a message from a higher level protocol, then places it in the data portion of the lower-level frame. The logistics of encapsulation require that packets traveling over a physical network contain a sequence of headers.
Ethernet	A local area network (LAN) technology which has extended into the wide area networks. Ethernet operates at many speeds, including data rates of 10 Mbps (Ethernet), 100 Mbps (Fast Ethernet), 1,000 Mbps (Gigabit Ethernet), 10 Gbps, 40 Gbps, and 100 Gbps.
Fiber Optics	A transmission medium consisting of thin glass or plastic filaments. Light beams (generated by an LED or laser) travel through the fiber optic line, carrying large amounts of data over long distances.
Flow Control	A congestion control mechanism that results in an ATM system implementing flow control.
Frame	A logical grouping of information sent as a link-layer unit over a transmission medium. The terms packet, datagram, segment, and message are also used to describe logical information groupings.
Full Duplex	A circuit or device permitting transmission in two directions (sending and receiving) at the same time.
G.703	An ITU standard for the physical and electrical characteristics of various digital interfaces, including those at 64 kbps and 2.048 Mbps.
Gateway	Gateways are points of entrance and exit from a communications network. Viewed as a physical entity, a gateway is that node that translates between two otherwise incompatible networks or network segments. Gateways perform code and protocol conversion to facilitate traffic between data highways of differing architecture.
Half Duplex	A circuit or device capable of transmitting in two directions, but not at the same time.
Impedance	The combined effect of resistance, inductance and capacitance on a transmitted signal. Impedance varies at different frequencies.
Interface	A shared boundary, defined by common physical interconnection characteristics, signal characteristics, and meanings of exchanged signals.
IP Address	Also known as an Internet address. A unique string of numbers that identifies a computer or device on a TCP/IP network. The format of an IP address is a 32-bit numeric address written as four numbers from 0 to 255, separated by periods (for example, 1.0.255.123).

Jitter	The deviation of a transmission signal in time or phase. It can introduce errors and loss of synchronization in high speed synchronous communications.
Laser	A device that transmits an extremely narrow and coherent beam of electromagnetic energy in the visible light spectrum. Used as a light source for fiber optic transmission (generally more expensive, shorter lived, single mode only, for greater distances than LED).
Latency	The time between initiating a request for data and the beginning of the actual data transfer. Network latency is the delay introduced when a packet is momentarily stored, analyzed and then forwarded.
Loading	The addition of inductance to a line in order to minimize amplitude distortion. Used commonly on public telephone lines to improve voice quality, it can make the lines impassable to high speed data, and baseband modems.
Loopback	A type of diagnostic test in which the transmitted signal is returned to the sending device after passing through all or part of a communications link or network.
Manager	An application that receives Simple Network Management Protocol (SNMP) information from an agent. An agent and manager share a database of information, called the Management Information Base (MIB). An agent can use a message called a traps-PDU to send unsolicited information to the manager. A manager that uses the RADview MIB can query the RAD device, set parameters, sound alarms when certain conditions appear, and perform other administrative tasks.
Master Clock	The source of timing signals (or the signals themselves) that all network stations use for synchronization.
Modular	Modular interfaces enable field-changeable conversion.
Multiplexer	At one end of a communications link, a device that combines several lower speed transmission channels into a single high speed channel. A multiplexer at the other end reverses the process. Sometimes called a mux. See **Bit Interleaving/Multiplexing**.
Network	(1) An interconnected group of nodes. (2) A series of points, nodes, or stations connected by communications channels; the collection of equipment through which connections are made between data stations.
parameters	Parameters are often called arguments, and the two words are used interchangeably. However, some computer languages such as C define argument to mean actual parameter (i.e., the value), and parameter to mean formal parameter. In RAD CLI, parameter means formal parameter, not value.
Parity Bit	An additional non-information bit added to a group of bits to ensure that the total number of 1 bits in the character is even or odd.

Physical Layer	Layer 1 of the OSI model. The layer concerned with electrical, mechanical, and handshaking procedures over the interface connecting a device to the transmission medium.
Port	The physical interface to a computer or multiplexer, for connection of terminals and modems.
prompt	One or more characters in a command line interface to indicate that the computer is ready to accept typed input.
Protocol	A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.
Pseudowire	Point-to-point connections set up to emulate (typically Layer 2) native services like ATM, Frame Relay, Ethernet, TDM, or SONET/SDH over an underlying common packet-switched network (Ethernet, MPLS or IP) core. Pseudowires are defined by the IETF PWE3 (pseudowire emulation edge-to-edge) working group.
Routing	The process of selecting the most efficient circuit path for a message.
Single Mode	Describing an optical wave-guide or fiber that is designed to propagate light of only a single wavelength (typically 5-10 microns in diameter).
Space	In telecommunications, the absence of a signal. Equivalent to a binary 0.
Sync	See **Synchronous Transmission**.
T1	A digital transmission link with a capacity of 1.544 Mbps used in North America. Typically channelized into 24 DS0s, each capable of carrying a single voice conversation or data stream. Uses two pairs of twisted pair wires.
T3	A digital transmission link with a capacity of 45 Mbps, or 28 T1 lines.
Telnet	The virtual terminal protocol in the Internet suite of protocols. It lets users on one host access another host and work as terminal users of that remote host. Instead of dialing into the computer, the user connects to it over the Internet using Telnet. When issuing a Telnet session, it connects to the Telnet host and logs in. The connection enables the user to work with the remote machine as though a terminal was connected to it.
Throughput	The amount of information transferred through the network between two users in a given period, usually measured in the number of packets per second (pps).

Quick Start Guide

If you are already familiar with the Optimux-34, use this guide to prepare the unit for operation.

1. Connecting the Interface Cables

Connecting the Tributary E1 Interfaces

➤ To connect the balanced E1 interface (RJ-45 connector)

- Connect the RJ-45 connector of the cable to the E1 port.

➤ To connect the unbalanced E1 interface (BNC connectors)

1. Connect the transmit cable to the coaxial connector of the E1 port marked IN.
2. Connect the receive cable to the coaxial connector of the E1 port marked OUT.

Connecting the V.35 Interface

➤ To connect the V.35 interface (Smart serial connector)

- Connect the V.35 cable supplied with the product to the V.35 interface smart serial connector.

Connecting the Uplink

➤ To connect the uplink:

1. Clean the optical connectors using an approved solvent, and dry thoroughly using optical tissue.
2. Connect to the two optical connectors designated TX (transmit output) and RX (receive input) of the appropriate interface.
3. Pay attention to correct connection of the transmit and receive cables to the corresponding connectors. Avoid sharp bends and twisting of the fiber-optic cables.

Note *For WDM option, only one fiber optic cable per link should be connected.*

2. Connecting the Power

Warning

Before connecting or disconnecting any communication cable, the unit must be earthed by connecting its power cord to a power outlet with an earth terminal, and by connecting the earth terminal on the panel (if provided) to a protective earth.

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

Connecting to AC Power

AC power is supplied to the Optimux-34 through a standard 3-prong plug.

AC power should be supplied via a 1.5m (5 ft) standard power cable terminated by a standard 3-prong socket. A cable is provided with the unit.

➤ **To connect to AC power:**

1. Connect the power cable to the power connector on the Optimux-34 front panel.
2. Connect the power cable to the mains outlet.

   The unit will turn on automatically upon connection to the mains.

Connecting to DC Power

A special IEC 60320 adapter for -48/-60 VDC power connection is supplied with the unit.

➤ **To connect to DC power:**

- Refer to the DC power supply connection supplement for instructions how to wire the DC cables. The DC supplement is provided on the technical documentation CD supplied with the unit.

Caution The DC installation procedure must be performed by a qualified technician.

3. Configuring Optimux-34

Configure Optimux-34 to the desired operation mode via an ASCII terminal connected to the front panel CONTROL port. The initial configuration of Optimux-34 includes selection of the clock source and the link redundancy.

Selecting the Clock Source

The clock source can be one of the following:

- Internal
- Loopback timing (LBT)

➤ **To select the Optimux-34 clock source:**

1. From the Main menu, select **Configuration**.

   The Optimux-34 Configuration menu is displayed.

2. From the Optimux-34 Configuration menu, select **System**.

   The System menu is displayed.

3. From the Clock Source menu, select **Local Source** or **Remote Source**.

   The desired Clock Source is displayed.

4. From the following menu select **Internal** or **Loopback Timing**.

Selecting the Link Redundancy

➤ **To select the Optimux-34 link redundancy:**

1. From the Configuration menu, choose **System**.
2. From the System menu, choose **Redundancy**.
3. From the Redundancy menu, choose either **Local Redundancy** or **Remote Redundancy**.
4. Use the Force Link option to toggle between **Link A** and **Link B**.
5. Use the Redundancy Mode menu to choose between **Auto**, **Manual** or **Off**.

Note *When Optimux-34 is working opposite Optimux-XLE1, the Ethernet USER port on Optimux-34 must be configured to 8 Mbps.*

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Appendix A. Pinouts

Chapter 1
Introduction

1.1 Overview

Optimux-34 provides a simple, flexible, and cost-effective solution for transporting multiple E1 channels and 10/100BaseT Ethernet over an E3 link to distances of up to 110 km (68 miles). It provides 16 E1 channels, and is designed for applications requiring the full E3 bandwidth multiple E1 connectivity. The E3 link is available with single mode fiber, single mode over single fiber, or coax interface.

The unit includes optional modular hot-swappable redundant power supplies. The optional second link provides backup using automatic switchover in case of link failure and a second E3 link provides automatic backup. The optional second power supply provides power redundancy for fail-safe operation.

Optimux-34 has various optical interfaces (based on SFP interfaces) available for both active and backup E3 link(s). It transmits each E1 channel independently so that the clock of each E1 channel is independent.

A user Ethernet port is supplied with the unit and is available for activation at any time with a software key. Bandwidth can be allocated between Ethernet and E1 according to the requirements of the user.

An optional V.35 interface is also available.

Product Options

Link Interface Options

Optimux-34 is available with an electrical link interface or a variety of fiber optic link options (see *Table 1-1* for details). The unit can also be ordered with a second redundant link (same as the first link).

Power Supply Options

Optimux-34 is available with one universal power supply, which is a hot-swappable wide-range, universal power supply for AC and DC options. It supports:

- 100–240 VAC power supply
- -48 VDC power supply.

In addition, the unit can be ordered with a second redundant power supply (same as the first power supply).

Table 1-1. Main Link Interface Options

Module Name (Ordering Option)	Transmitter Type and Wavelength [nm]	Connector Type	Fiber Type	Typical Output Power [dBm]	Receiver Sensitivity [dBm]	Typical Range [km]	Typical Range [miles]
SFP-12	–	SMB	Coax cable	–	–	(According to ITU-T G.703 standard)	
SFP-1	LED, 1310	LC	62.5/125 Multimode	-18	-31	6.5	4.0
SFP-2	Laser, 1310	LC	9/125 Single mode	-12	-31	38	23.6
SFP-3	Long haul laser, 1310	LC	9/125 Single mode	-2	-34	70	43.4
SFP-4	Long haul laser, 1550	LC	9/125 Single mode	-2	-34	110	68.3
SFP-10a	Laser WDM, Transmit: 1310 Receive: 1550	LC	9/125 Single mode (single fiber)	-12	-30	40	24.8
SFP-10b	Laser WDM, Transmit: 1550 Receive: 1310	LC	9/125 Single mode (single fiber)	-12	-30	40	24.8

Note

Typical ranges are calculated according to attenuation of 0.4 dB/km for 1310 nm, 0.25 dB/km for 1550 nm and 3.5 dB/km for 850 nm multimode modules.

Applications

The Optimux-34 unit permits improved utilization of E3 links, both electrical and optical, due to its capability to multiplex 16 channels. Five of the most frequently used applications are depicted in *Figure 1-1,* to *Figure 1-5*.

Point-to-Point Application

In *Figure 1-1*, a company campus line or a line leased from a local operator is used to link two Optimux-34 units situated at a distance ranging from several hundreds of meters to several tens of kilometers. A backup link is optionally used to ensure uninterrupted data flow between the two sites. The Optimux-34 at each site is connected to E1 access equipment like PBXs and 64 kbps multiplexers.

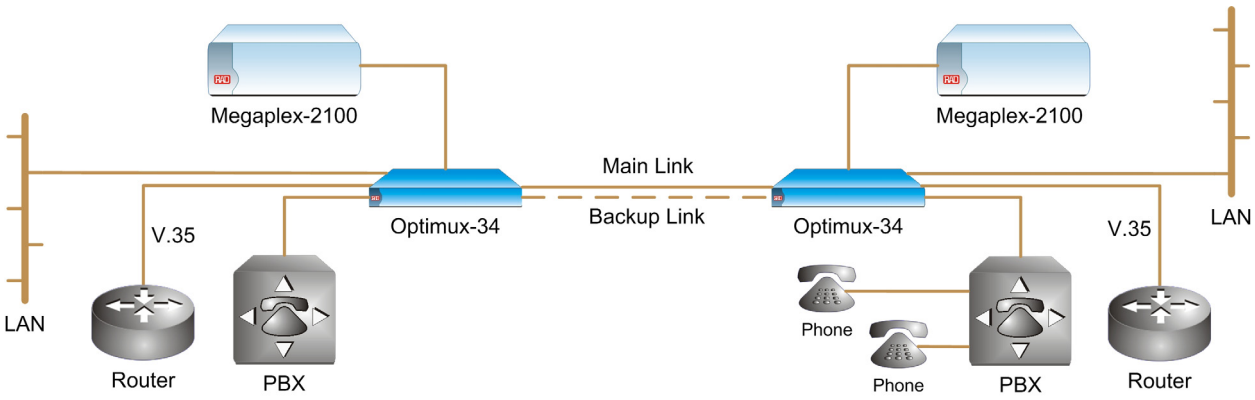


Figure 1-1. Optimux-34 Point-to-Point Link Application

Backbone Data Network Application

In the application shown in *Figure 1-2*, a coax link module is installed in the Optimux-34 unit that is physically close to the public network. The other Optimux-34 is equipped with a fiber optic link interface to extend its transmission range. The optical link is connected to a fiber optic modem (FOM) with an E3 interface, which is coupled to the public network via a coaxial cable.

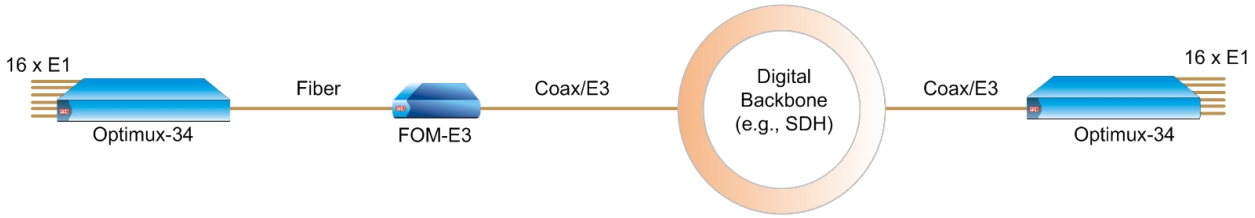


Figure 1-2. Optimux-34 Backbone Access Application

Wireless Link Application

A wireless link application shown in *Figure 1-3* is a wireless link connecting two Optimux-34 units. The Optimux-34 unit can be connected to a Megaplex-2100 unit and a network management service (NMS). A coax link module is installed in each of the Optimux-34 unit that is physically close to the wireless device.

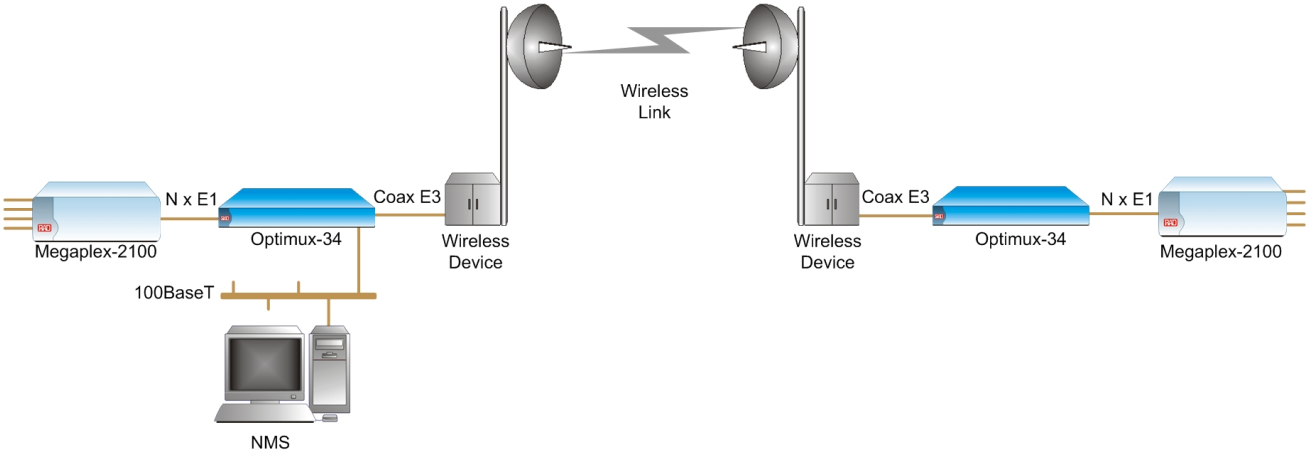


Figure 1-3. Wireless Link Connecting Optimux-34 Units

Fan Out of E1 Channels Application

Figure 1-4 illustrates a fan out of E1 channels from a standard E3. The Optimux-34 unit is connected to a switch through a coaxial cable.

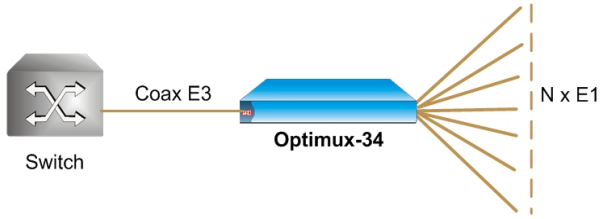


Figure 1-4. Fan out of E1 Channels from a Standard E3

E1 Services from the Network to a Remote Site Extension Application

Figure 1-5 shows Optimux-34 a fan out of E1 channels on a remote site extension. The Optimux-34 unit is connected to a fiber optic modem (FOM-E3) with an E3 interface, to a distance of up to 110 km.

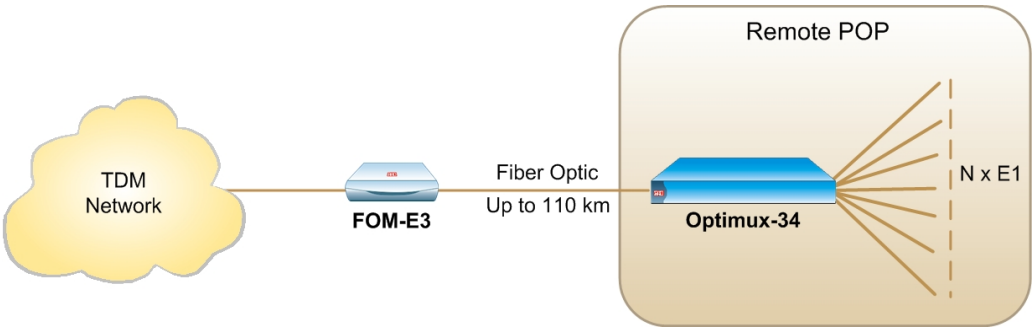


Figure 1-5. Extending E1 Services from the Network to a Remote Site

Features

A combination of 16 E1 ports and 10/100BaseT USER Ethernet and V.35 interface can be combined into a single E3 uplink. It integrates multiple E1 links and is suitable for E3 transmission over coax or various modes of fiber optic transmission.

Optimux-34 features link redundancy (an optional backup link), which enables coupling of fiber optics and coax modules to the link and has an optional modular hot-swappable redundant power supply and a second E3 link for automatic backup. It also has an optional alarm port. It can accommodate up to two (one redundant power supply in case of power failure or disconnection) built-in universal power supplies for a wide range of power sources.

The device offers user-selectable bandwidth allocation between E1 and USER Ethernet ports. User Ethernet is activated by means of a license.

The V.35 interface is available on both the 1U and 2U devices. The V.35, when selected, is fixed on channel 16 and has a rate fixed at E1.

The 2U box supports unbalanced E1 only on the tributaries.

Optimux-34 provides various optical interfaces for both the active and the backup E3 link(s) (see *Table 1-1*). If an incorrect SFP is inserted, an alarm is set and the SFP vendor parameters are displayed.

Optimux-34 has internal and loopback timing for the uplink, and internal, external, and loopback timing for the V.35 interface.

Management and diagnostics can be performed via an: ASCII terminal, supervisory port, a Telnet terminal, Ethernet management port, an SNMP management station via the Ethernet port, a dedicated separate Ethernet management port, RADview-PC running in a Windows environment, RADview-HPOV for Unix platforms, or ConfiguRAD web-based remote access terminal application.

An optional alarm port with dry relay contacts is available for interfacing major and minor alarms.

Optimux-34 conforms to ITU G.703, G.742, G.751, G.823, G.955, and IEEE 802.3 standards.

1.2 Physical Description

Optimux-34 is available as a compact 44 mm (1U) high or 2U high units intended for installation in 19-inch racks using an adapter kit. For rack installation instructions refer to the *Rack Mounting Kit for 19-inch Racks Guide* that comes with the RM kit. *Figure 1-6* shows a 3D view of the 1U-high and the 2U-high Optimux-34.

Figure 1-6. Optimux-34 1U-high and 2-U high with V.35 Interface

The front panel of Optimux-34 includes the following connectors: E1 or E3 uplink with SFP fiber optics or coax modules; Ethernet MNG, Ethernet USER; optional V.35; RS-232 control port alarm, and power supply. Front panel LEDs indicate system and link status. For details on the front panel, its connectors and LEDs, see the *Installation and Setup* chapter.

1.3 Functional Description

E3 Link Interface

Optimux-34 can be ordered with an E3 electrical or a fiber optic link interface. The electrical interface provides short-range transmission according to ITU-T G.703 via the coaxial cable infrastructure. The optical interface is used to extend the transmission range to 110 km (68 miles), enhance transmission security and achieve immunity against electrical interference.

User Ethernet Port

The 10/100BaseT module supports two queues for handling priority with 2:1 weighted fair priority scheme as follows:

- Tagged frames with tagged fields 4-7 are ingressed into the high priority queue.
- Tagged frames with tagged fields 0-3 are ingressed into the low priority queue.

The user Ethernet port has a fault propagation option, which causes the LAN link to fall in case a signal loss, a frame loss, or an AIS is detected in the active E3 link.

The User Ethernet port supports the IEEE 802.3x flow control and backpressure features, as well as automatic MDI/MDIX crossover.

Optimux-34 is supplied with a 10/100BaseT Ethernet that can be activated at any time by purchasing, downloading, and installing a user-installable software key.

E1/Ethernet Granularity

E1 and Ethernet share bandwidth resources in Optimux-34. The following table lists the possible options available when combining E1 and Ethernet services.

Table 1-2. E1 and Ethernet Combinations

Available E1 ports	Ethernet Capacity [Mbps]
16	0
12	8
8	16
4	24
0	32

Note *In order to establish connection between the Ethernet USER ports of two Optimux-34 units, it is necessary to disable an appropriate number of E1 ports according to the required connection bandwidth of the Ethernet link starting from the first E1 port. To enable the Ethernet USER port, you must disable the first E1 ports, 1 to X. (1-4, 1-8, 1-12 or 1-16) according to the required bandwidth.*

V.35 Interface

Channel 16 can be selected for E1 or for V.35. When selected for E1, channel 16 works as a regular E1 channel. If selected as V.35, the V.35 interface becomes active and works at a fixed E1 rate.

V.35 is a DCE interface and supports both ISO 2110 and Telebras pinouts according to the ordering options.

The V.35 module supports three clock modes: Internal, External and Loopback Timing.

Redundancy Functions

The redundant power supply and the redundant link modules ensure that Optimux-34 continues to operate even if one of these critical modules fails.

Power Supply Redundancy

In the redundant power supply mode, both supplies share the Optimux-34 power consumption. If one of the power supply modules fails, the entire power consumption of the unit is automatically drawn from a single power supply. In this case, the respective PWR LED on the front panel indicates the active power supply.

Link Redundancy

An additional link interface can be ordered for backup. The two link interfaces must be either both electrical or both fiber optic. If they are fiber optic, they can be of different types. The link interfaces are implemented by interchangeable link modules plugged into two dedicated SFP slots at the front of the Optimux-34 unit designated LINK A (MAIN) and LINK B (BACKUP). Front panel LEDs provide AIS and signal loss (SYNC LOSS) indications on the link.

When two link modules are installed, the redundancy mechanism of the Optimux-34 is used to do one of the following:

- If LINK A fails, then the link interface automatically changes to LINK B.
- Force transmission via the MAIN link using a software management tool for maintenance purposes if the redundancy mode is OFF.

When the redundancy mode is MANUAL and the main link is disconnected or fails, the backup link is forced into the active state. The main link will not resume transmission as long as the redundancy mode is MANUAL.

Tributary Interface Characteristics

Optimux-34 supports 16 E1 channels. The E1 interfaces, both RJ-45 and BNC, comply with the ITU-T Rec. G.703. Line coding is HDB3. Balanced transmit levels are nominally ±3V for balanced termination and ±2.37V for unbalanced termination. A pair of LEDs monitors loss-of-signal and AIS on each E1 receive line.

Management Requirements

The Optimux-34 features a V.24/RS-232 port to enable management using an ASCII supervision terminal.

The management interface also includes an SNMP agent that enables SNMP management of the Optimux-34, using the Ethernet protocol. The SNMP management capability enables fully graphical, user-friendly management using the RADview network management stations offered by RAD, as well as management by other SNMP-based management systems.

Remote management is also possible using the Telnet communication protocol, and ConfiguRAD web-based application that uses TCP/IP communication, without the SNMP service. Telnet support enables a remote IP host to control the operation of Optimux-34 using functions identical to those provided by a supervision terminal. The Telnet management function can be protected by the manager password feature.

The front-panel LEDs of the devices monitor system failure and tests (loop connections). Alarms are monitored using the dry contacts of the Optimux-34 alarm relays on a dedicated D-type connector.

Clocking

Optimux-34 transmits each E1 channel separately so that the clock of each E1 channel is independent.

The E3 interface supports internal and loopback timing modes. The V.35 interface supports internal, external, and loopback timing modes.

The figures below describe the three clock modes supported by the V.35 interface.

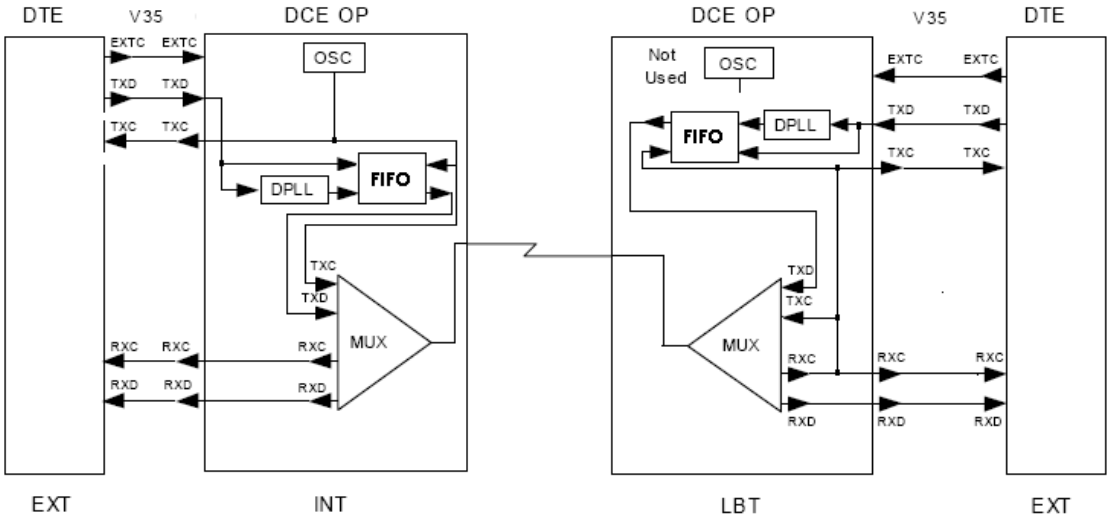


Figure 1-7. Internal and Loopback Timing

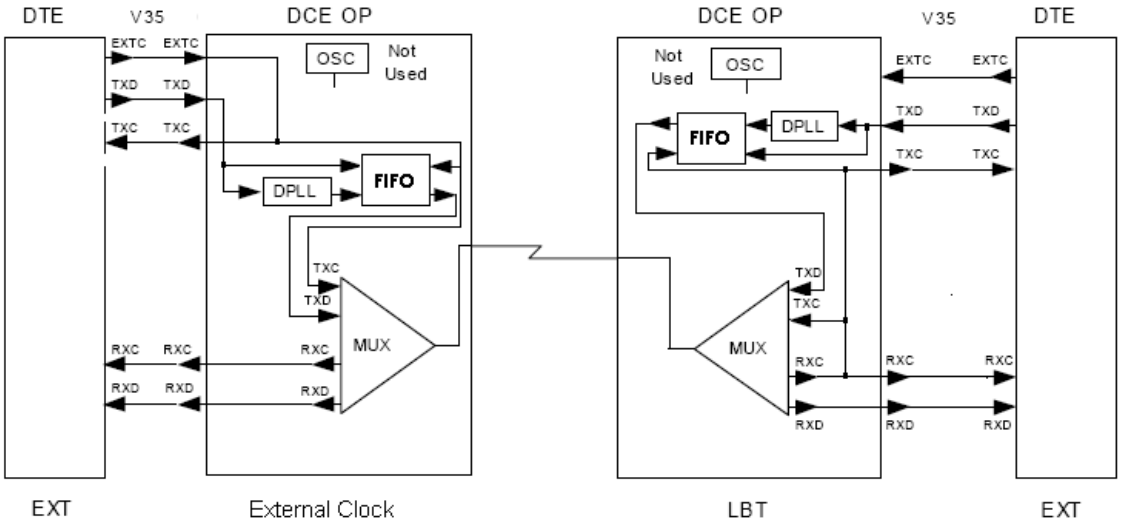


Figure 1-8. External and Loopback Timing

Power Requirements

Optimux-34 has a hot-swappable, wide range, universal power supply for AC and DC options.

A second power supply is optionally installed in the Optimux-34 to assure continuous operation in case of supply failure. When the two supplies are turned ON, they share the power consumption of the unit. If one of the power supplies fails, the other provides the full power consumption.

1.4 Technical Specifications

Electrical Link Interface (E3)

Electrical Interface	According to ITU-T Rec. G.751
Jitter	According to ITU-T Rec. G.823
Data Rate	34,368 kbps
Line Code	HDB3
Impedance	75Ω unbalanced
Range	According to ITU-T Rec. G.703
Connectors (2)	SMB-BNC
Redundancy	Additional electrical link is optional

Fiber Optic Link Interface	*Applicable Standard*	ITU-T Rec. G.652
	Line Code	CDP
	Performance	Refer to *Table 1-1*
	Connectors	• SFP interfaces with LC connectors • SFP interface with SC/APC for single wavelength single fiber interface options, see *Table 1-1*.
	Redundancy	Additional fiber optic link is optional
E1Channel Interface	*Electrical Interface*	According to ITU-T Rec. G.703
	Jitter	According to ITU-T Rec. G.823
	Data Rate	2,048 kbps
	Line Code	HDB3
	Range	According to ITU-T G.703
	Ports	16 E1 ports
	Port Type	Balanced (120Ω), RJ-45 Unbalanced (75Ω), BNC ***Note**: The 2U box supports unbalanced only.*
V.35 Channel Interface	*Data rate*	2.048 Mbps
	Timing	Internal, External and Loopback timing
	Connector	DB-25
	Control Signals	RTS, CTS, DTR, DSR and DCD
Management Ports	*Physical Interface*	10/100BaseT MNG-ETH ports
	Data Rate	10/100 Mbps
	Transmission Mode	• Full/half-duplex • Autonegotiation enable/disable • Filter enable/disable • Flow Control and Backpressure enable/disable

User Ethernet Port	*Physical Interface*	10/100BaseT
	Data Rate	10/100 Mbps
	Transmission Mode	• Full/half-duplex • Autonegotiation enable/disable • Multicast frames enable/disable • Flow Control and Backpressure enable/disable
	Bridge Parameters	• Data transfer rate: up to 32 Mbps maximum • 2K supported addresses • Supported frame size: up to 1536 bytes • Throughput: up to 60,386 pps (32 Mbps data transfer rate, 64-byte frames) • Latency: 30 µsec (32 Mbps data transfer rate, 64-byte frames) • Compatible with IEEE 802.3, 802.3x, 802.3u, 802.1p and 802.1q (802.1D relevant parts) • Fault propagation in LAN in case of WAN error (optional) • Connector: RJ-45
Power	*Number of Supplies*	One or two (power sharing)
	Power Supply	100-240 VAC, 0.25A or -48 VDC, 0.35A
	Power Consumption	AC: 32 VA max DC: 13W max
Unit Indications and Alarms	*Unit Indications*	See *Table 3-1.*
	Dry Contacts	• Maximum Ratings: 1A, 60 VDC, 30 VAC • Major alarms: Power off; E1 loss of signal; E3 loss of frame on the active link; E3 loss of signal on the main link; E3 loss of signal on the backup link in Automatic/Manual redundancy mode; backup link does not install in Automatic/Manual redundancy mode. In redundant power supply mode: one power supply is faulty; self-test fail. • Minor alarm: Power off, AIS on E1 input line, AIS on link input • Connector: 9-pin D-type female

Alarm Port	(Dry relay contacts for major and minor alarms)	
	Connector	9-pin D-type female connector
Control Ports	*CONTROL*	ITU-T V.24/EIA RS-232 ASCII terminal port
	Rate	9600-115200 bps
	Connector	RS-232 DB-9 connector
	MNG-ETH	10/100BaseT Fast Ethernet
	Connector	Shielded RJ-45
Physical Characteristics	*Height*	1U: 4.4 cm (1.8 in) 2U: 8.8 cm (3.5 in)
	Width	44 cm (17 in) both 1U and 2U
	Depth	24 cm (9 in) both 1U and 2U
Environmental Characteristics	*Temperature*	0° to 50°C (32° to 122°F)
	Humidity	Up to 90% non-condensing

Chapter 2

Installation and Setup

Optimux-34 is delivered completely assembled. It is designed for installation as a desktop unit or for mounting on a 19-inch rack. For rack installation instructions, refer to the *Rack Mounting Kit for 19-inch Racks Guide* that comes with the RM kit.

After installing the unit, refer to the *Chapter 3* for system operating instructions. In case a problem arises, refer to the *Chapter 5* for test and diagnostics instructions.

Warning

No replacement of cards and cables or other repairs may be performed by either the operator or the user. Such activities may be performed only by a skilled technician who is aware of the hazards involved.

Always observe standard safety precautions during installation, operation, and maintenance of this product.

Note

Before installing the product, review Handling Energized Products *in the Front Matter of the manual.*

2.1 Site Requirements and Prerequisites

Optimux-34 units should be installed within 1.5m (5 ft) of an easily accessible grounded outlet for a hot-swap wide-range universal PS15 AC/DC power supply.

The input voltage at the end of the power cable 100 to 240 VAC and -40 to -72 VDC, should be within these limits.

Allow at least 90 cm (36 in) of frontal clearance for operator access.

When planning the routing of fiber optic cables, avoid sharp bends. The bending radius should exceed 30 mm (1.2 in).

The ambient operating temperature of Optimux-34 should be 0°C to 50°C (32°F to 122°F) at a relative humidity of up to 90%, non-condensing.

2.2 Package Contents

A preliminary inspection of the equipment contained in the shipping box should be made before unpacking. Evidence of damage should be noted and reported immediately. The Optimux-34 package includes the following items:

- Optimux-34 unit
- Technical Documentation CD

- AC power supply cable
- Special DC power supply cable
- CBL-SMB-BNC/M adapter cable (if an E3 electrical interface is ordered)

Note

If the 1U Optimux-34 is ordered with an unbalanced E1 interface, then 16 cable adapters CBL-RJ45/2BNC/E1/X are supplied.

2.3 Required Equipment

The following equipment is required to install Optimux-34:

- Fiber optic cables (for optical uplink interface)
- RJ-45 E1 connector cables (for balanced tributary interface)
- RJ-45 Ethernet connector cable category 5
- Philips screwdriver (for installation in 19-inch rack).

2.4 Mounting the Unit

Optimux-34 is designed for installation as a desktop or wall-mounted unit. It may also be mounted in a 19" rack.

- For rack mounting instructions, refer to the *RM-34 Kit Installation Manual*.
- If Optimux-34 is to be used as a desktop unit, place and secure the unit on a stable, non-movable surface.

Refer to the clearance and temperature requirements in *Site Requirements and Prerequisites*.

2.5 Identifying Optimux-34 Modules

Table 2-1 lists the modular construction of the Optimux-34 unit. Use this to identify the modules supplied.

Table 2-1. List of Optimux-34 Modules

Module Designation	Fixed/ Optional	Location	Used to provide
E3 unbalance (coax) Link	Optional	Front slots LINK A/B	Unbalanced interface to the link.
E3 fiber optic Link	Optional	Front slots LINK A/B	Fiber optic interface to the link.
Power supply–PWR-A	Optional	On the front side	Optimux-34 supply voltages
Power supply–PWR-B	Optional	On the front side	Power supply redundancy - power consumption sharing or full consumption in case of power supply A failure.

Note

If the 16 E1 unbalanced interface option is needed, order the 2U Optimux-34.

If there is not enough space for the 2U-high device, the 1U device can be used with the RJ-45 to BNC adapter cable (CBL-RJ45/2BNC/E1/X) and 2 BNC cables for each channel.

2.6 Connecting to Optimux-34

The E1, USER Ethernet, MNG Ethernet, V.35 interface, alarm, power supplies, tributary and link connectors are all located on the front panel of the unit as shown in the following figures. Front panel LEDs indicate system and link status. The management, alarm, and link connectors are detailed in *Table 2-2*.

The rear panel of the Optimux-34 unit is blank. All connectors are located on the front panel.

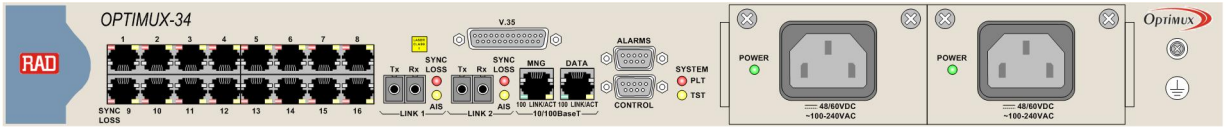


Figure 2-1. Typical 1U-high Front Panel with Optional Alarm and V.35 Connectors

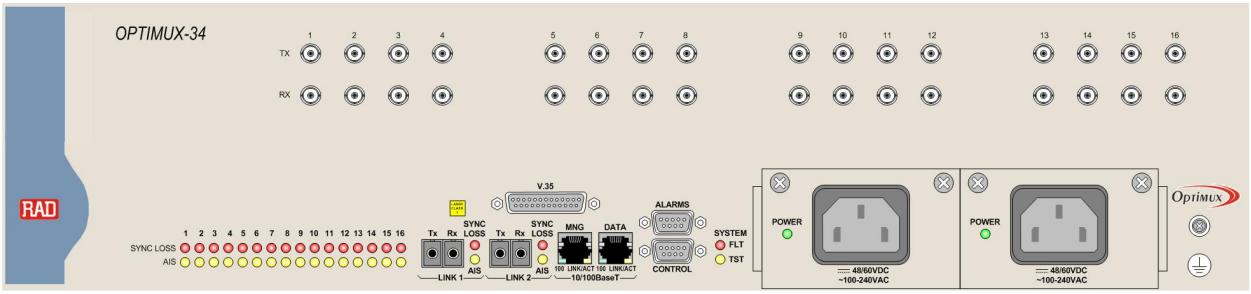


Figure 2-2. Typical 2U-high Front Panel with Optional Alarm and V.35 Connectors

Table 2-2. Management, Alarm and Link Connectors

Connector	Type	Used to Connect
POWER A	Standard 3-prong plug	Main power source
POWER B	Standard 3-prong plug	Redundant power source when the redundant power supply option is selected
CONTROL	9-pin D-type female	RS-232 ASCII terminal
TRIBUTARY CHANNELS	1U: 16 RJ-45 or BNC (via adapter cable) 2U: BNC	16 E1 balanced or unbalanced channels
USER-ETH	RJ-45	USER-ETH input
MNG-ETH	RJ-45	MNG-ETH input
ALARMS	9-pin D-type female straight	Optimux-34 dry contacts of two alarm relays (major and minor) to a remote monitoring site
LINK A, TX/RX	SMB-BNCx2	Electrical link
LINK B, TX/RX	SMB-BNCx2	Electrical link
LINK A, B TX/RX	LC or SC/APC	Fiber-optic link
V.35	DB25	V.35 Interface

For the pin assignment of the connectors, refer to the *Appendix A.*

Warning

ELECTRICAL SHOCK HAZARD: Access to the inside of the equipment is permitted only to qualified and authorized service personnel.

Before disconnecting the unit from its cables, verify that the remote unit is turned OFF. Disconnect the unit from the power line and from all the cables before removing the cover.

Dangerous high voltages are present inside the Optimux-34 when it is connected to power. Moreover, under external fault conditions, dangerous high voltages may appear on the lines connected to the Optimux-34.

Capacitors inside the instruments may still be charged even after the unit has been disconnected from the supply source.

Any setting or repair of the open unit under voltage should be avoided as much as possible and, when inevitable, would be carried out only by a skilled technician who is aware of the hazard involved.

Caution

Optimux-34 contains components sensitive to electrostatic discharge (ESD). To prevent ESD damage, avoid touching the internal components. The E1 channels are not protected against over voltages. Adequate surge suppressors should be installed into the building wiring.

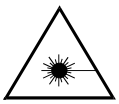
Connecting to Channel Connections

Connect the channel cables to connectors corresponding to the interface in use as indicated in *Table 2-3*.

Table 2-3. Cable to Interface Connections

Interface	Connector Type	Note
Tributary E1 balanced	RJ-45	Channel numbers 1 to 16 for the Optimux-34 balanced
Tributary E1 unbalanced	1U: BNC (via adapter cable) 2U: BNC direct	1U: The E1 receive line connects to the BNC adapter cable connector designated IN. The E1 transmit line connects to the BNC connector designated OUT. 2U: The E1 receive line connects to the BNC connector designated RX. The E1 transmit line connects to the BNC connector designated TX.
USER-ETH	RJ-45	Physical connection of 10/100BaseT user Ethernet
MNG-ETH	RJ-45	Physical connection of 10/100BaseT management Ethernet
V.35	DB25	Physical connection of the V.35 interface. The V.35 interface supports Telebras or ISO 2110 pinout (according to ordering option.)

Connecting to E3 Link



Warning

Eye damage may be caused by a broken or non-terminated fiber-optic or connector if the laser beam is viewed directly or with improper optical instruments.

One or two (main and backup) link interfaces are provided according to order.

In normal operation a module must be installed in the main link.

The electrical interface is provided with a pair of SMB-BNC connectors and the maximum line attenuation that is permitted according to ITU-T G.703 is 12 dB.

For the properties and specifications of the optical link interfaces, refer to the *Fiber Optic Interface Options* table.

Note *When working with WDM modules, the two types SF1 and SF2 must work one opposite the other. SF1 does not work opposite SF1 and SF2 does not work opposite SF2.*

Table 2-4. E3 Link Connections

Interface	Connector Type	Note
Optical	LC or SC/APC	Avoid sharp bends of the optical cables. The minimum-bending radius should be 30 mm (1.2 in). Cleanliness of the optical connectors: use an approved solvent, and dry thoroughly using optical tissue. Connection of the receive cable to the optical connector designated RX and the transmit cable to the optical connector designated TX.
Electrical	SMB-BNC	Use the CBL-SMB-BNC/M adapter cable for connecting to the regular BNC connectors

Connecting to Alarm Relay

The alarm cable is terminated with a 9-pin D-type male connector on the unit side. The maximum rating of the alarm relay contacts for planning the monitoring means and cabling is 1A, 60 VDC or 30 VAC.

The dry contacts of the Optimux-34 alarm relays (major and minor) are connected to a remote monitoring site via the front panel ALARM connector.

Connecting to Management Station

The Optimux-34 can be managed via:

- V.24/RS-232 terminal. The connection cable to the V.24/RS-232 interface on the unit's front panel should be terminated with a 9-pin D-type male connector. The nominal length of the cable for a data rate of 19.2 kbps is 16m (50 ft).

Caution

Terminal cables must have a frame ground connection. Use ungrounded cables when connecting a supervisory terminal to a DC-powered unit with floating ground. Using improper terminal cable may result in damage to supervisory terminal port.

- Ethernet port. The connection cable to the MNG-ETH interface on the unit's front panel should be terminated with an RJ-45 connector.

Note

The Ethernet cable should be straight (i.e., TX on pins 1,2 and RX on pins 3,6.) There is no crossover at the PHY.

Connect the management cable to the required management port. The options available are indicated in *Table 2-5*.

Table 2-5. Management Port Options

Interface	Connector Type	Note maximum cable length
RS-232	9-pin D-type	16m (50 ft) for a 115 kbps data rate
MNG-ETH	RJ-45	100m for a UTP cable, type 5

2.7 Connecting to Power

The Optimux-34 chassis ground is connected to the protective ground (middle) pin of the power connectors, for the universal power supply version of the unit.

Intentional disconnection of the protective ground is prohibited since such an action may expose personnel to electrical shock hazards.

Warning

Before connecting or disconnecting any communication cable, the unit must be earthed by connecting its power cord to a power outlet with an earth terminal, and by connecting the earth terminal on the panel (if provided) to a protective earth.

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting of the protective earth terminal can make this unit dangerous. Intentional interruption is prohibited.

For the universal power supply ratings, refer to the *Site Requirements and Prerequisites* section in this chapter.

Connecting to AC Power

AC power is supplied to the Optimux-34 through a standard 3-prong plug.

AC power should be supplied via a 1.5m (5 ft) standard power cable terminated by a standard 3-prong socket. A cable is provided with the unit.

➤ **To connect to AC power:**

1. Connect the power cable to the power connector on the Optimux-34 front panel.
2. Connect the power cable to the mains outlet.

   The unit will turn on automatically upon connection to the mains.

Connecting to DC Power

A special IEC 60320 adapter for -48/-60 VDC power connection is supplied with the unit.

➤ **To connect to DC power:**

- Refer to the DC power supply connection supplement for instructions how to wire the DC cables. The DC supplement is provided on the technical documentation CD supplied with the unit.

Chapter 3

Operation

3.1 Turning On Optimux-34

➤ **To turn ON the Optimux-34 unit:**

Use a power cable to connect the Optimux-34 unit to the mains.

Note

For the first operation and before synchronization of two units, declare the link redundancy in the same configuration for both units. In addition, declare the timing for both units in a valid configuration (i.e., not both units on Loop Back Timing – LBT).

3.2 Optimux-34 Controls and Indicators

This chapter presents information and description of the Optimux-34 front panel, controls and how to turn on the Optimux-34 unit.

Front Panel Controls

The Optimux-34 front panel provides the LED indications and the connections to the Ethernet LAN, V.35 interface and to the E1 channels as shown in *Figure 3-1*, *Figure 3-2*. *Table 3-1* lists the functions of the LEDs, switches, and connectors located on the Optimux-34 front panel.

Optimux-34 is available in 1U and 2U-high models with optional alarm and V.35 interface connectors as shown in the following figures:

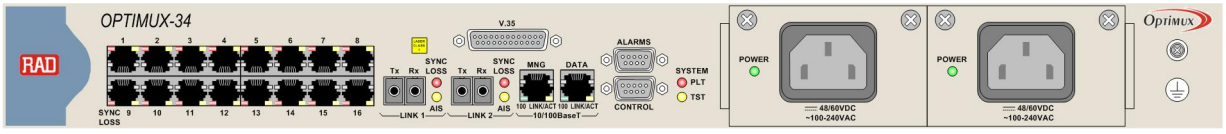


Figure 3-1. Typical 1U-high Front Panel with Optional Alarm and V.35 Connectors

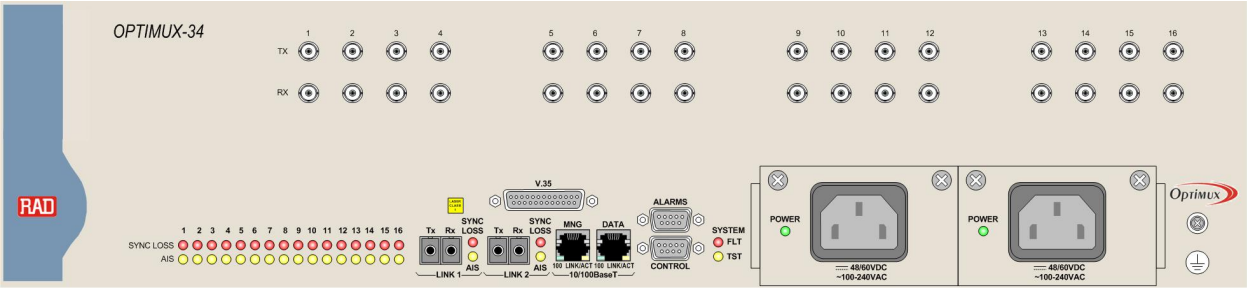


Figure 3-2. Typical 2U-high Front Panel with Optional Alarm and V.35 Connectors

Table 3-1. Optimux-34 Front Panel Controls and Indicators

Name	Type	State	Function
PS A	Indicator	OFF	Indicates that the unit is not powered
		ON (green)	Indicates that power supply A is ON and operates normally
		ON (red)	Indicates that a malfunction was detected in PS A or it is not powered on. If PS B is installed Optimux-34 will continue to operate normally.
PS B	Indicator	OFF	Indicates that the unit is not powered
		ON (green)	Indicates that power supply B is ON and operates normally
		ON (red)	Indicates that a malfunction was detected in PS B or it is not powered on. If PS A is installed Optimux-34 will continue to operate normally.
SYSTEM TST	Indicator	ON (yellow)	Indicates that the system is on loop test.
		Blinking (yellow)	Indicates that the system is during Auto baud detect process.
SYSTEM FLT	Indicator	ON (red)	Indicates a control system fault or a failure detected during the turn ON self test.
LINK A SYNC LOSS	Indicator	ON (red)	Indicates that a loss-of-signal has been detected on the main link.
		Blinking (red)	Indicates that in Manual Redundancy mode, LINK A is the main link and is available but the signal is received from the backup link (LINK B)
LINK A AIS	Indicator	ON (yellow)	Indicates that an alarm indication signaling has been detected on the link
LINK B SYNC LOSS	Indicator	ON (red)	Indicates that a loss-of-signal has been detected on the backup link
		Blinking (red)	Indicates that in Manual Redundancy mode LINK B is the main link and is available but the signal is received from the backup link (LINK A)
LINK B AIS	Indicator	ON (yellow)	Indicates that an alarm indication signaling has been detected on the backup link

Table 3-1. Optimux-34 Front Panel Controls and Indicators (Cont.)

Name	Control	State	Function
MNG-ETH LINK/ACT	Indicator	ON (yellow)	Indicates that the link is up on the Management port.
		Blinking (yellow)	Indicates that LAN traffic is actively being transferred via the management port.
		OFF	Indicates that the link is down on the Management port.
MNG-ETH 100	Indicator	ON (green)	Indicates that actual traffic speed on the management port is 100 Mbps
		OFF	Indicates that actual traffic speed on the management port is 10 Mbps
USER-ETH LINK/ACT	Indicator	ON (yellow)	Indicates that the link is up on the USER Ethernet port.
		Blinking (yellow)	Indicates that LAN traffic (RX or TX) is actively being transferred via the management port.
USER-ETH 100	Indicator	ON (green)	Indicates that actual traffic speed on the USER Ethernet port is 100 Mbps
		OFF	Indicates that actual traffic speed on the USER Ethernet port is 10 Mbps
SYNC LOSS 1-16	Indicator	ON (red)	Indicates that a loss-of-signal has been detected on the respective channel of the E1 interface.
AIS 1-16	Indicator	ON (yellow)	Indicates that an alarm indication signaling has been detected on E1 port
Ports1-16	Connector	–	Connects E1 port of the E1 module to the E1 network
V.35 Port	Connector	–	Connects V.35 port of the V.35 module to the V.35 line
SFP Slot A	Connector	-	Connects the SFP module to the main board at slot A
SFP Slot B	Connector	-	Connects the SFP module to the main board at slot B
ALARMS	Connector	–	Connects the dry contacts of the Major and Minor alarm relays to a remote monitoring site
CONTROL/MNG	Connector	–	Connects the V.24/RS-232 management port to an ASCII terminal
MNG-ETH	Connector	–	Connects the Ethernet port to the Management port
USER-ETH	Connector	–	Connects the Ethernet port to the USER port
PS A	Connector	–	Connects the Optimux-34 to the AC mains or to the DC power source
PS B	Connector	–	Connects the Optimux-34 to the AC mains or to the main DC power source

Normal Indications

During normal operation, the LED indications shown in *Table 3-2* should appear:

Table 3-2. LED Indications

LED	State	Indicates
PWR	ON, green	Power supplies of the Optimux-34 unit active
FLT	OFF	–
TST	OFF	–
100	ON, green	ON if actual traffic speed is 100 Mbps OFF if actual traffic speed is 10 Mbps
LINK/ACT	Blinking, yellow	Ethernet port traffic
SYNC LOSS	OFF, Red	Loss of receive signal on E1 ports
AIS	OFF, Yellow	AIS received on E1 ports

3.3 Default Settings

Table 3-3 lists the default settings of the Optimux-34 configuration parameters.

Table 3-3. Default Settings

Type	Parameter	Default Value
System		
Device Information	Name	Optimux-34
	Location	The Location of the Device
	Contact Person	Name of Contact Person
Host	IP address	0.0.0.0
	IP mask	0.0.0.0
	Default gateway	0.0.0.0
	Read Community	public
	Write Community	private
	Trap Community	public
Management Access	Telnet	All
	SNMP	All
	Web	All
Control Port	Baud rate	115200
	Security timeout	10

Type	Parameter	Default Value
	Pop alarms	Off
Fault Propagation		Off
Alarms	Device	Local
	Alarms	Unmasked
	Remote Connection Fall	Unmasked
Redundancy	Force Link	Link A
	Mode	Auto
Physical Layer		
Ethernet	Device Number	Local
	Port Number	MNG-ETH
	Port Name	-
	Auto Negotiation	Enable
	Flow Control	Enable
	Alarms	Unmasked
V.35	Device Number	Local
	Administrative Status	Up
	Port Name	-
	Clock Source	Internal
	DCD Status	Permanent ON
	CTS Status	Permanent ON
	DTE Loop Detection	Disable
	Alarms	Unmasked
Link	Device Number	Local
	Port Number	Link A
	Port Name	-
	Alarms	Unmasked
E1	Device Number	Local
	Port Number	1
	Port Name	-
	Alarms	Unmasked
Diagnostics	Device Number	Local
	Link Loop type	No Loop
	Link LLB loop timeout (min) [1-255]	5
	Channel's Loops	No Loop

3.4 Configuration and Management Alternatives

If required, Optimux-34 can be reconfigured. The Optimux-34 configuration and monitoring operations are performed using any of the following tools:

- ASCII Terminal Connected to Supervisory Port (Command Line Interface or menu driven)
- ConfiguRAD, a Web-based management system, using a Web browser running on a PC connected to the network
- RADview, an SNMP-based management system with a Graphical User Interface. See the RADview-TDM package and its manual, *RADview-TDM User's Manual*, for details.

Detailed configuration procedures are given in *Chapter 4*.

The following functions are supported by the Optimux-34 management software:

- Viewing system information
- Modifying configuration and mode of operation, including setting system default values
- Monitoring Optimux-34 performance
- Initiating diagnostic tests
- Upgrading software.

Configuring Optimux-34 for Management

The Optimux-34 provides the following terminal management modes:

Monitor A supervisory ASCII VT100 terminal or a PC emulating an ASCII VT100 terminal connected directly to the Optimux-34 CONTROL port.

Ethernet A PC running terminal emulation software or a management workstation connected to the Optimux-34 via the management ports.

Managing a Local Optimux-34 via the ETH Management Port

The configuration of Optimux-34 is performed via menu-driven embedded software, using a standard ASCII terminal or PC running a terminal emulation application connected to the CONTROL port. Alternatively, you can manage Optimux-34 over Telnet, a PC running a Web browsing application or RADview application via the MNG-ETH port.

➤ **To prepare Optimux-34 for network management:**

1. Connect a LAN network management station to one of the Optimux-34 Ethernet ports.
2. Configure the Management Host parameters of the Optimux-34 units via an ASCII terminal.
3. Run an SNMP management application, such as RAD's RADview, or open a Telnet session (for example, Windows **Start** menu | **Run** | **Telnet**

<IP_address>), or open a Web Browser to: http://<IP_address>, where <IP_address> is Optimux-34's IP address.

Starting a Control Session

Once you have installed Optimux-34 and have completed the installation and operation procedures as described in *Chapters 2* and *Chapter 3*, you can start a control session.

➤ **To set the terminal communication parameters:**

1. Connect the terminal to the 9-pin CONTROL connector. Run a terminal emulation program.
2. Set the default parameters of the terminal communication port to 8 bits per character, one stop bit and no parity bit.
3. Disconnect Optimux-34 from the mains, and then reconnect it to the mains.
4. Wait for about half a minute while the software is unpacking. Afterwards the System Test LED will be blinking in yellow.
5. While system test LED is blinking, press <.> at least four times until Optimux-34 detects the correct baud rate
6. Optimux-34 automatically detects and adapts itself to terminal baud rates of: 9,600, 19,200, 38,400, 57,600, and 115200 bps. After detecting the correct baud rate, Optimux-34 displays the user name and password entry form.

Preparing Optimux-34 for Control Session

This section describes how to prepare Optimux-34 and the supervisory terminal for the control session.

Optimux-34 includes a V.24/RS-232 asynchronous DCE port, designated CONTROL and terminated in a 9-pin D-type female connector. The control port continuously monitors the incoming data stream and immediately responds to any input string received through this port. The port requires straight cable for the ASCII terminal connection. The Optimux-34 control port can be configured to communicate at the following rates: 9.6, 19.2, 38.4, 57.6, or 115.2 kbps (default 115.2 kbps). The word format consists of one or two stop bits and 8 data bits; parity is disabled.

Any standard ASCII terminal (a "dumb" terminal or a personal computer running a terminal emulation application) equipped with a V.24/RS-232 communication interface can be used to configure Optimux-34. *Appendix A* details the pin assignment and control signal directions of the Optimux-34 control connector.

Note

Up to three users can connect to Optimux-34 simultaneously.

Choosing Options

➤ **To choose an option:**

1. Type the number corresponding to the option, and press <**Enter**>.

Optimux-34 immediately updates its database with a new value or displays a new menu for the selected option.

2. If a menu option has only two values, typing the option number and pressing ‹Enter› will toggle between the available values. If an action requires confirmation, a prompt line is added to the menu display.

Note

When using a Web browser, values that you enter are not saved unless you press ‹Enter›. If you click a link before doing so, your changes are lost.

Correcting Entries

➤ To correct an erroneous entry:

- Press ‹Backspace› to clear the error, and then enter the correct characters. or
- Press ‹Esc› to exit the current menu, and then return to the menu to re enter the required value.

Navigating Data Forms

Some of the Optimux-34 management software screens are data forms, which are bigger than regular menus and require scrolling to navigate between parameters.

Use the following keys (case-sensitive) for the data form navigation:

L	Move left, l – scroll left,
R	Move right, r – scroll right
U	Move up, u – scroll up
D	Move down, d – scroll down
‹Tab›	Select next changeable cell
N	Display next part of menu,
P	Display previous part of menu.
!	Exit to the main menu
&	Exits to the log in screen

Note

You can display these navigation keys by typing ‹?› from a data form.

Entering the User Name and Password

In the password prompt screen (below), you are required to enter a user name and password in order to start the Optimux-34 management software.

To prevent unauthorized modification of the operating parameters, Optimux-34 supports two access levels:

Superuser	can perform all the activities supported by the Optimux-34 management facility, including defining new users.
User	has access rights (full control or read only) defined by the superuser. Users are not allowed to create new users.

1. After the SW finishes uploading, press **Enter** a few times.

   "..." appears.

2. Press <.> a few times until the following Password Prompt screen appears. (This synchronizes the baud rate of the terminal to the setup configuration).

```
                          Optimux-34

USER NAME:  SU
PASSWORD:   ****

ESC - clear; & - exit                                  1  user(s)
```

Figure 3-3. Password Prompt Screen

Note *It is recommended to change default passwords to prevent unauthorized access to the unit.*

➤ **To enter as a superuser:**

1. Enter **su** for user name.
2. Enter **1234** for password.

This allows you to configure all the parameters of Optimux-34, and to change the *su* and *user* passwords.

➤ **To enter as a user:**

1. Enter **user** for user name.
2. Enter **1234** for password.

➤ **To set all passwords to the default values (1234):**

- Log in as **su** and delete the unit's configuration through the configuration screens.

Entering the Terminal Session

Once you have logged into the system, the Optimux-34 main menu is displayed.

```
                          Optimux-34
Main Menu

 1. Inventory          >
 2. Configuration      >
 3. Monitoring         >
 4. Diagnostics        >
 5. Utilities          >

>
Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 3-4. Main Menu

Working with Web Browser

Web Browser Requirements

The following Web browsers can be used to access the Optimux-34 supervision utility from any location that enables access to the Optimux-34 using Internet protocols.

- Internet Explorer 6.0, running on Windows™ 98, Windows™ 2000, Windows™ XP
- Netscape Communicator 7.1, running on Windows™ NT or Unix.

Note

Please enable pop-ups in your browser settings, if applicable.

Login

➤ To login via Web browser:

1. Connect the MNG-ETH port of the Optimux-34 to the LAN.
2. Open the Web browser.
3. Disable any pop-up blocking software, such as Google Popup Blocker.
4. Enter the IP address of the Optimux-34 in the address field of the browser in the following format: **http://'IP address'** and then press **‹Enter›** to command the browser to connect (**'IP address'** stands for the actual Optimux-34 IP address which has to be assigned via an ASCII terminal).
5. After the opening window is displayed, click **LOGIN**.
6. Enter your user name and password.

   The Main menu is displayed.

Navigating the ConfiguRAD Menus

ConfiguRAD is a Web-based remote access terminal management software. It provides a user-friendly interface for configuring, collecting statistics and performing diagnostic tests on the Optimux-34 units.

➤ To choose an option:

1. Click a link in the ConfiguRAD screen to display the next menu.
2. Once the target screen is displayed, select a value from the drop-down box or enter it in a text box.

At the left-hand bottom corner, ConfiguRAD provides some auxiliary management tools:

Status	Shows the number of users currently managing Optimux-34
Trace	Opens an additional pane for system messages, progress indicators (ping, software and configuration file downloads) and alarms. It is recommended to keep the trace pane open all the time.
Refresh All	Refreshes performance registers.

Working with RADview

RADview-EMS is a user-friendly and powerful SNMP-based application for management and service provisioning. It offers pseudowire service provisioning, as well as embedded element management capabilities.

RADview-EMS provides a dedicated graphical user interface (GUI) for monitoring RAD products via their SNMP agents. RADview agent for Optimux-34 is bundled in the RADview-EMS/TDM package for PC (Windows-based) or Unix.

The RADview Optimux-34 Element Manager main window provides a dynamically updated representation of Optimux-34, allowing you to monitor and manage the Optimux-34. The main window displays the device hardware configuration, showing the system and existing ports.

For more details about this network management software, and for detailed instructions on how to install, set-up and use RADview – contact your local distributor or refer to the RADview-EMS/TDM documentation.

3.5 Menu Map

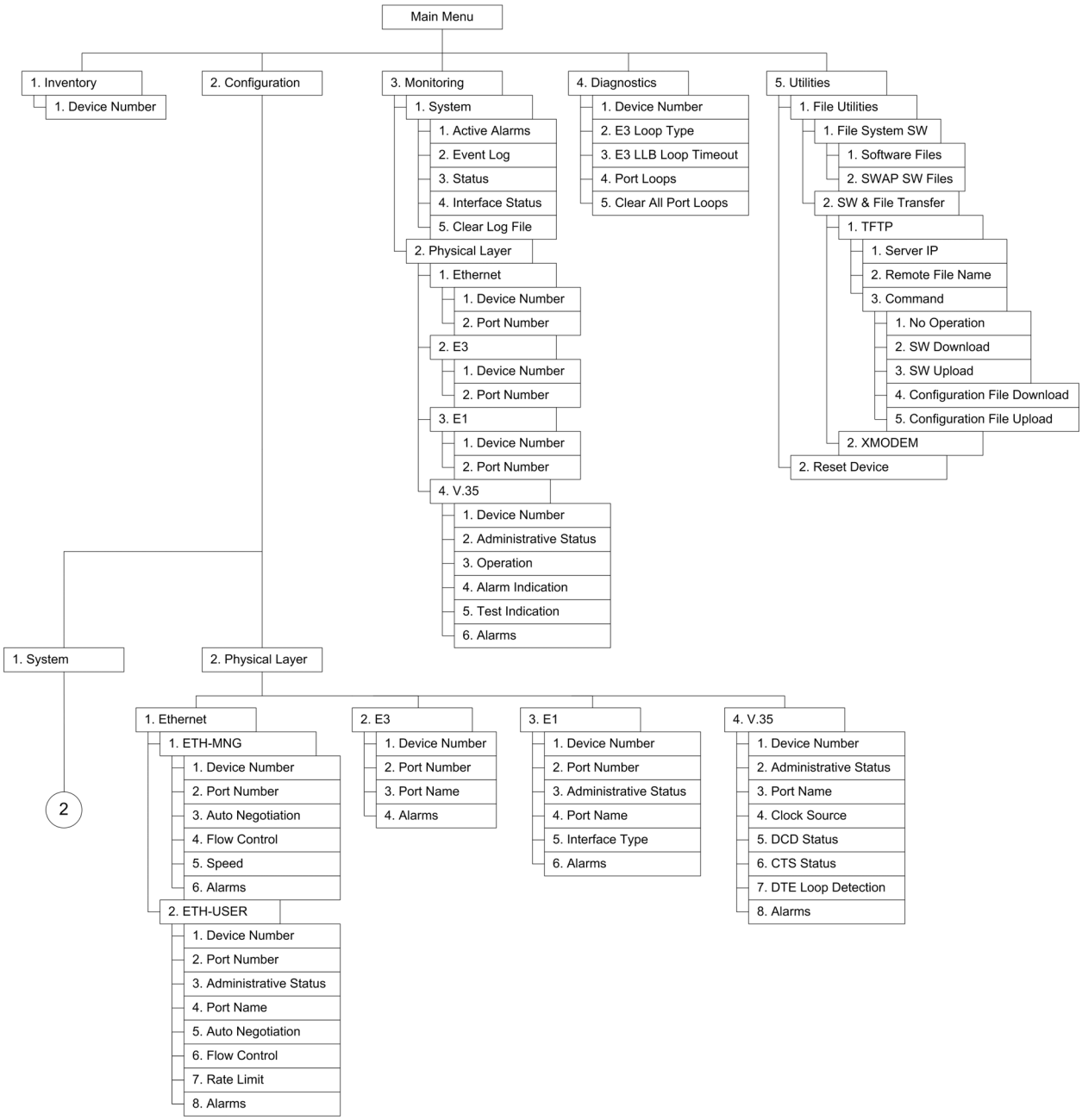


Figure 3-5. Optimux-34 Menu Map Page 1

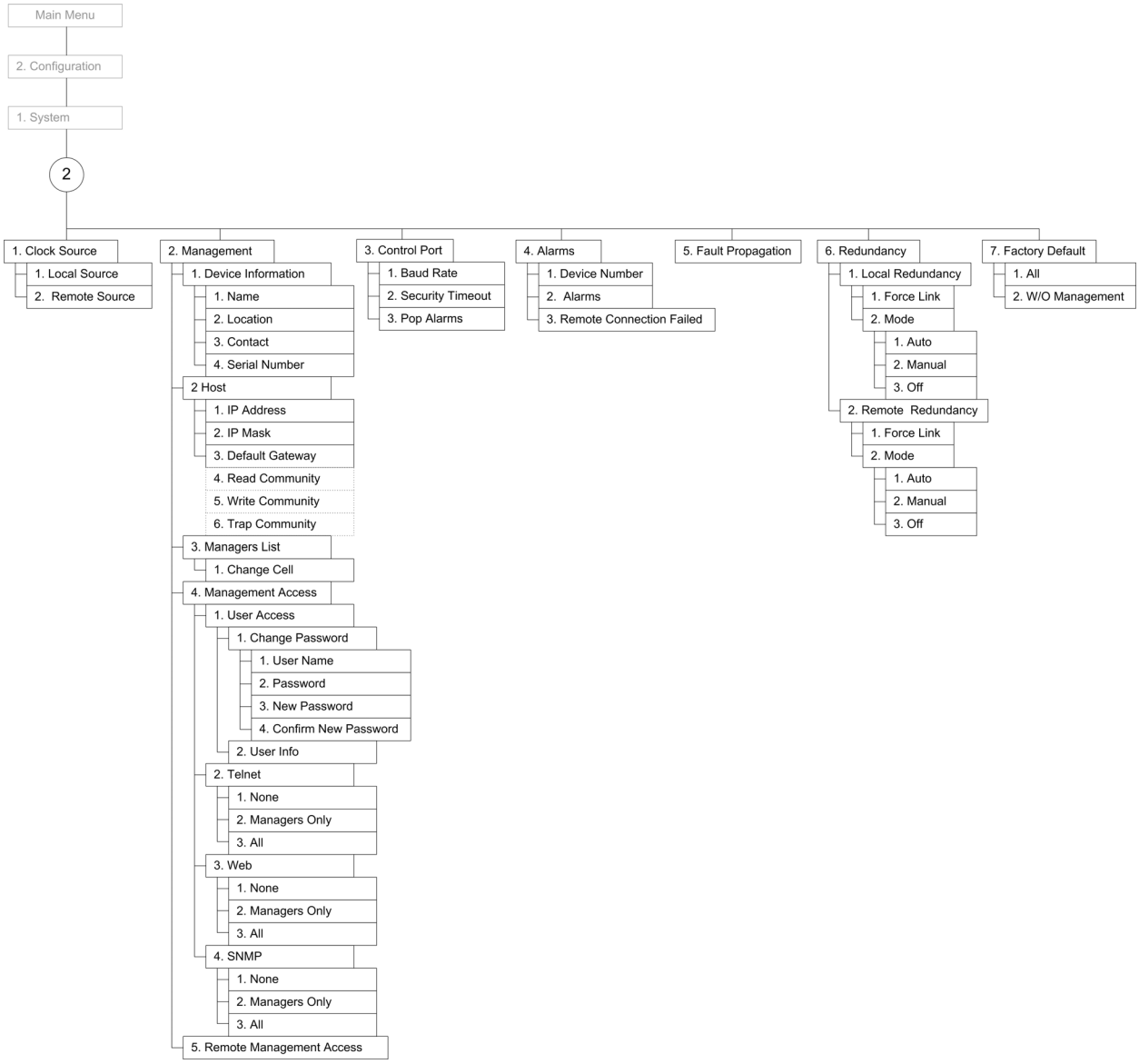


Figure 3-6. Optimux-34 Menu Map Page 2

3.6 Turning Off Optimux-34

➤ To turn off Optimux-34:

- Disconnect the Optimux-34 unit from the mains.

Chapter 4
Configuration

4.1 Configuring Optimux-34 for Management

Configuring Management Parameters

Optimux-34 can be managed from a workstation located on a LAN connected to the unit's MNG-ETH port. To establish a proper connection, it is necessary to configure the following parameters: host *IP Address, IP Mask, Default Gateway, Traps, Read community,* and *Write community*.

Note

Changes made to SNMP parameters take effect immediately.

Configuring the Ethernet Management Port

The Ethernet option is for the configuration of the management Ethernet port in the Optimux-34 device.

1. From the Configuration menu, select **Physical Layer**.

   The Physical Layer menu is displayed.

2. From the Physical Layer menu, select **Ethernet**.

   The Ethernet menu is displayed (*Figure 4-1*).

   The Ethernet menu may display the configuration for either MNG-ETH or USER-ETH depending on the Port Number selected. To toggle between configurations, select **Port Number** and the Port Number Menu appears.

```
Configuration>Physical Layer>Ethernet

 1. Device Number                > (Local)
 2. Port Number                  > (MNG-ETH)
 3. Auto negotiation               (Enable)
 4. Flow Control                   (Enabled)
 5. Alarms                         (Unmasked)

>
Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-1. Ethernet Menu

Table 4-1 describes the fields in the Ethernet Management menu.

Table 4-1. Ethernet Management Values

Field	Description	Possible Values	Visibility
Device Number	The device value	Remote **Local**	Always
Port Number	The Fast Ethernet port number	MNG-ETH USER-ETH	Always
Autonegotiation	Enables autonegotiation	Disabled (2) **Enabled** (1)	Always
Flow Control	Configures the default administrative PAUSE mode for this interface.	Disabled **Enabled**	Always
Alarms	Masks MNG-ETH alarms.	Masked **Unmasked**	Always

3. Select **Device Number** option and configure to either **Local** or **Remote**.
4. Select **Port Number** to set the Fast Ethernet port number to **MNG-ETH** or **USER-ETH**.
5. Select **Autonegotiation** and toggle between the **Enabled** and **Disabled** options.
6. Select **Flow Control** to toggle between the **Enabled** and **Disabled** options.
7. Select **Alarms** to Mask or Unmask the MNG-ETH alarms.

4.2 Configuring Optimux-34 for Operation

The Optimux-34 management software enables to perform the following:

- Selecting the clock source
- Configuring redundancy of uplink
- Defining control port parameters.

Configuring the Master Clock Source

Optimux-34 features a number of Clock options. Refer to *Chapter 1* for details.

➤ **To configure the master clock:**

1. From the System menu, choose **Clock Source**.

   The Clock Source menu is displayed.

```
                          Optimux-34
Configuration>System>Clock Source

 1. Local Source               > (Internal)
 2. Remote Source              > (Loopback Timing)

>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-2. Clock Source Menu

Table 4-2 describes the Local and Remote Source fields in the Clock Source menu (see *Figure 4-2*).

Table 4-2. Clock Source Values

Field	Description	Possible Values	Visibility
Local Source	Local device clock souce	Internal Loopback Timing	Always
Remote Source	Remote device clock souce	Internal Loopback Timing	When connected to a remote device

Notes

- *The Remote Source option is available only when the Optimux-34 is connected to a remote device.*
- *After resetting to the default values, the clock configuration is INTERNAL.*

2. From the Clock Source menu, choose either Local Source or Remote Source.

   The Local Source menu is displayed.

```
                          Optimux-34
Configuration>System>Clock Source>Local Source (Internal)

 1. Internal
 2. Loopback Timing

>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-3. Local Source Menu

3. Choose either Internal timing or Loopback Timing).

Setting the Device Information

Each Optimux-34 unit can be configured to retain information about the unit, such as its location and a name to easily identify the unit on the network.

➤ **To set device information:**

1. From the System menu, choose **Management**.

   The Management menu is displayed.

```
Configuration>System>Management

 1. Device Information            >
 2. Host                          >
 3. Managers List                 []>
 4. Management Access             >
 5. Remote Management Access        (High)

>
Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-4. Management Menu

Table 4-3 describes the Remote Management Rate field in the Management menu (see *Figure 4-4*).

Table 4-3. Management Values

Field	Description	Possible Values	Visibility
Remote Management Access	Management of the remote device. Devices version 6.0 and before, the rate has to be set to Low (300 bps). The rate has to be set to High (1.2 kbps) for new devices.	**Low** (on Factory default) High	Always

2. Select **Device Information**.

   The Device Information menu is displayed.

   The *Description* line identifies the device, along with the current hardware and software version numbers.

```
Configuration>System>Management>Device Information

    Description   … (Optimux-34 HW Version:1.00/B, SW Version:2.81)
 1. Name          … (Optimux)
 2. Location      … (The location of this device)
 3. Contact       … (Name of contact person)
 4. Serial number … ()

>
Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-5. Device Information Menu

3. To define a contact person, choose **Contact** and then enter the name, phone and/or other details you want to save in this field, see *Figure 4-5*.

Table 4-4 describes the Description, Name, Location, and Contact Person fields in the Device Information menu (see *Figure 4-5*).

Table 4-4. Device Information Values

Field	Description	Possible Values	Visibility
Description	Description of the device including its software and hardware versions		Always
Name	Device containing up to 32 characters	Optimux	Always
Location	Device location containing up to 32 characters	The location of the device	Always
Contact Person	A person's name containing up to 32 characters	Name of contact person	Always
Serial number	The serial number of this product.		Always

4. To specify a name to identify the Optimux-34 device, choose **Name** and then enter the name. It is easier to identify the device by a name than by its IP address.
5. To specify a system location, choose **Location** and then enter the location of the Optimux-34 unit.

Setting the Network Parameters

When you integrate Optimux-34 into your network, you need to set the network parameters of Optimux-34.

➤ **To set network parameters:**

1. From the Management menu choose **Host**.

   The Host menu is displayed.

```
Configuration>System>Management>Host

 1. IP Address                    … (192.168.238.172)
 2. IP Mask                       … (255.255.255.0)
 3. Default Gateway               … (192.168.238.1)
 4. Read Community                … (public)
 5. Write Community               … ()
 6. Trap Community                … ()

>
Please select item <1 to 6>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-6. Host Screen

Table 4-5 describes the fields in the Host screen (see *Figure 4-6*).

Table 4-5. Host Values

Field	Description	Possible Values	Visibility
IP Address	The IP address of the host interface	**0.0.0.0** to 255.255.255.255	Always on
IP Mask	The host inteface subnet mask	**0.0.0.0** to 255.255.255.255	Always on
Default Gateway	The gateway IP address used for routing the outgoing IP packets	**0.0.0.0** to 255.255.255.255	Always on
Read Community	The read community containing up to 20 characters	**Public**	Always on
Write Community	The write community containing up to 20 characters	**NULL**	Always on
Trap Community	The trap community containing up to 20 characters	**NULL**	Always on

2. From the Host screen, select **IP Address** and enter the IP address to set the IP address of the Optimux-34 unit.
3. Select **IP Mask** and enter an IP LAN mask.
4. Select **Default Gateway** and enter the IP address of the gateway.
5. Select **Read Community** to set the read community.
6. Select **Write Community** to set the write community.
7. Select **Trap Community** to set the trap community.

Setting up the Manager List

The manager list defines the network management stations that will receive traps from the SNMP agent of the Optimux-34. Up to ten managers can be defined. A manager can be masked to temporarily prevent it from receiving traps.

By default, any remote management terminal is allowed to change the configuration of the Optimux-34. You may enhance the security of the site by limiting remote management to specific management terminals or nodes. The Manager List lists the network nodes from which management may take place.

➤ **To define the manager list:**

1. From the Management menu, (see *Figure 4-4*), select **Managers List**.

   The Managers List screen is displayed.

```
Configuration>System>Management>Managers List
    Num        IP address         Trap
     1           0.0.0.0        Unmasked
     2           0.0.0.0        Unmasked
|    3           0.0.0.0        Unmasked
v    4           0.0.0.0        Unmasked
     5           0.0.0.0        Unmasked

 1. Change cell                      … (0.0.0.0)
>
ESC-prev.menu; !-main menu; &-exit                      1 user(s)
```

Figure 4-7. Managers List Screen

Table 4-6 describes the IP address and the Trap mask fields in the Managers List menu (see *Figure 4-7*).

Table 4-6. Managers List Values

Field	Description	Possible Values	Visibility
IP Address	The manager's IP address	**0.0.0.0** to 255.255.255.255	Always on
Trap Mask	Masks and unmasks traps to the Manager	Masked, **Unmasked**	Always on but access is only possible when the IP address is provided.

2. The list contains 10 entries. Use the Tab key to select next changeable cell.
3. To change the IP value of a cell, select the field (it will appear highlighted), then choose **Change Cell** and enter the new IP value.
4. To change the Trap Mask value of a cell, select the field (it will appear highlighted), then choose ‹**1**› for Masked, or ‹**2**› for Unmasked.

Management Access

You can enable or disable access to the Optimux-34 management system via SNMP, Telnet or Web-based applications. By disabling SNMP, Telnet, or Web, you prevent unauthorized access to the system when security of the Optimux-34 IP address has been compromised. When SNMP, Telnet and Web access is disabled, Optimux-34 can be managed via an ASCII terminal only.

➤ **To configure Management Access parameters:**

1. From the Management Menu, choose **Management Access**.

   The Management Access Menu is displayed:

```
Configuration>System>Management>Management Access

 1. User Access                >
 2. TELNET                     > (All)
 3. WEB                        > (All)
 4. SNMP                       > (All)

>
Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-8. The Management Access Menu

Table 4-7 describes the Telnet, Web, Web Trace Refresh and SNMP fields in the Management Access menu (see *Figure 4-8*).

Table 4-7. Management Access Values

Field	Description	Possible Values	Visibility
Telnet	Defines access to Telnet	None – access is not permitted Managers Only – access only from stations defined in the Managers list **All** – for all users	Always
Web	Defines access to the Web	None – access is not permitted Managers Only – access only from stations defined in the Managers list **All** – for all users	Alway
SNMP	Defines access to SNMP	None – access is not permitted Managers Only – access only from stations defined in the Managers list **All** – for all users	Always

2. Select **Telnet** for Telnet access by selecting **All** (default), **None**, or **Managers Only**.
3. Select **SNMP** for SNMP access by selecting **All** (default), **None**, or **Managers Only**.
4. Select **Web Trace Refresh** for Web access by selecting a number from **1-255**.

Note

The device allows up to three users (Supervisory Terminal required, and two additional users; Telnet, SNMP, or WEB).

Configuring the Control Port

The control port is used to connect a console terminal to the Optimux-34 device.

➤ **To configure the control port:**

1. From the System menu, select **Control Port**.

The Control Port menu is displayed.

```
Configuration>System>Control Port

 1. Baud Rate                    >   (115200bps)
 2. Security Timeout             >   (10min)
 3. Pop Alarms                   >   (OFF)

>
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-9. Control Port Menu

Table 4-8 describes the **Baud Rate**, **Security Timeout** and **Pop Alarms** fields in the Control Port menu (see *Figure 4-9*).

Table 4-8. Control Port Values

Field	Description	Possible Values	Visibility
Baud Rate	Terminal baud rate	9600 bps 19200 bps 38400 bps 57600 bps **115200 bps**	Always
Security Timeout	Gives an indication to exit the terminal after 10 minutes when a key is not pressed	Off **10 min**	Always
Pop Alarms	Displays the changes in the alarms on the lower part of the terminal screen	On **Off**	Always

2. From the Control Port menu, select **Baud Rate**.

   The Baud Rate menu is displayed.

```
Configuration>System>Control Port>Baud Rate (115200 bps)

 1. 9600 bps
 2. 19200 bps
 3. 38400 bps
 4. 57600 bps
 5. 115200 bps

>
Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-10. Baud Rate Menu

3. Choose the baud rate that matches your management terminal device.

Configuring Security Timeout

The timeout specifies a time interval after which Optimux-34 automatically disconnects from the supervisory terminal (or Telnet or Web application) if no input from the user is detected. The timeout can be set to 10 minutes, or disabled.

➤ To Configure the Security Timeout:

From the Control Port menu, select **Security Timeout** to toggle between the two available positions:

10 min After 10 minutes the Optimux-34 automatically disconnects from the management session. To reconnect, press ‹**Enter**› on the management terminal and then log in again.

OFF Security Timeout is not active.

Enabling and Disabling Pop-up Messages

When the pop-up function is enabled, Optimux-34 displays messages as they are generated by the system or received by the interfaces. The messages are displayed at the bottom of the terminal screen.

➤ To enable or disable pop-up alarms:

- From the Control Port Menu, select **Pop alarms**, to choose the pop-up messages mode:
  - ON (pop-up messages are enabled)
  - OFF (pop-up messages are disabled).

Setting the Fault Propagation

➤ To turn Fault Propagation On/Off:

- Select **Fault propagation** to toggle between **On** and **Off**.

  When fault propagation is **On**:
  - When signal loss or sync loss is detected on the active uplink, the USER-ETH port on both local and remote units is shut down.
  - When the USER-ETH port detects that the link is down, the USER-ETH port on the remote unit is automatically shut down.

  When fault propagation is **Off**: Deactivates the Fault propagation functionality.

Setting the Alarms

The local system alarms have to be masked or unmasked to prevent setting the alarm in the log file and dry contact activation. When the alarms are unmasked, traps will not be sent to the alarms and dry contact will not activate.

➤ To mask or unmask the alarms:

1. From the System Menu, select **Alarms**.

The Alarms menu is displayed.

```
Configuration>System>Alarms

 1. Device Number              >   (Local)
 2. Alarms                     >   (Unmasked)
 3. Remote connection fail     >   (Unmasked)

>
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-11. Alarms Menu

Table 4-9 describes the Local and Remote Alarm fields in the Alarms menu (see *Figure 4-11*).

Table 4-9. Alarms Values

Field	Description	Possible Values	Visibility
Alarms	Masks or Unmasks the local/remote system alarms. It prevents setting the alarms in the log file so no trap is sent for these alarms and the dry contact will not be activated.	Masked **Unmasked**	Always
Remote connection fail	Masks or Unmasks the remote connection fail diagnostic.	Masked **Unmasked**	Always

2. From the Alarms menu, select **Alarms** to mask or unmask the local or remote alarm.

Configuring Redundancy between the Local and Remote Devices

When the redundant link is installed and the redundancy mode is set to AUTOMATIC, Optimux-34 starts using the main link. It automatically switches to the backup link when the selected main link fails (signal loss/sync loss). The LINK A/B SYNC LOSS LED on the front panel indicates the deactivated link. Optimux-34 switches back to the main link, when the signal is recovered.

When the redundant link is installed and the redundancy mode is MANUAL, Optimux-34 starts using the main link. It automatically switches to the backup link when the main link fails (signal loss/sync loss). The LINK A/B SYNC LOSS LED on the front panel indicates the deactivated link. The backup link remains active even when the main link recovers. Switching back to the main link is performed by setting the redundancy mode to AUTOMATIC from the terminal or by turning the system OFF and then ON.

When the management link-redundancy is OFF, the redundancy function is not available.

➤ **To configure the uplink redundancy mode for the local and remote devices:**

- From the System menu, choose **Redundancy**.

The Redundancy menu is displayed.

Note

The Remote Redundancy option is available only when the Optimux-34 is connected to a remote device.

➤ **To configure redundancy on the Optimux-34 or the active link:**

1. From the Redundancy menu, select **Local/Remote Redundancy**.

   The Local Redundancy menu is displayed.

```
Configuration>System>Local Redundancy

 1. Force Link                 >   (LINK A)
 2. Mode                       >   (AUTO)

>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-12. Local Redundancy Menu

Table 4-10 describes the Force Link and Mode fields in the Local/Remote Redundancy menu (see *Figure 4-12*).

Table 4-10. Local/Remote Redundancy Values

Field	Description	Possible Values	Visibility
Force Link	The active link	**LINK A** LINK B	Always
Mode	The redundancy mode	**Auto** Manual Off	Always

2. Select **Force Link** to select **Link A** or **Link B** as the main link.
3. From the Local/Remote Redundancy menu, select **Mode**.

   The Mode menu is displayed.

```
Configuration>System>Local Redundancy>Mode (AUTO)

 1. AUTO
 2. MANUAL
 3. OFF

>
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-13. Redundancy Mode Menu

4. Choose the redundancy mode you want to use: **Auto**, **Manual** or **Off** (refer to *Chapter 3* for details).

Configuring the Physical Ports

Configuring the Ethernet User Port

➤ **To configure the Ethernet User port:**

1. From the Ethernet menu (*Figure 4-1*), select Port Number.

   The Port Number menu opens.

2. From the Port Number Menu, choose **USER-ETH**.

   The Ethernet User menu appears.

```
Configuration>Physical Layer>Ethernet

 1. Device Number                >  (Local)
 2. Port Number                  >  (USER-ETH)
 3. Administrative Status           (Up)
 4. Port Name                    ...()
 5. Auto Negotiation             >  (Enable)
 6. Flow Control                 >  (Enable)
 7. Rate Limit                   >  (0 Mbps)
 8. Alarms                       >  (Unmasked)

>
Please select item <1 to 8>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-14. Ethernet User Menu

Table 4-11 describes the fields in the Ethernet User menu.

Table 4-11. Ethernet User Values

Field	Description	Possible Values	Visibility
Device Number	The device value	**Local** Remote	Always
Port Number	The Fast Ethernet port number	MNG-ETH USER-ETH	Always
Administrative Status	Port status	Up Down	Always
Port Name	User chosen		Always
Autonegotiation	Enables Autonegotiation	**Enabled (1)** Disabled (2)	Always
Flow Control	Configures the default administrative PAUSE mode for this interface.	Disabled **Enabled**	Always

Field	Description	Possible Values	Visibility
Rate Limit	Limits the rate of the USER-ETH port.	0 Mbps 6 Mbps 12 Mbps 18 Mbps 24 Mbps	Always
Alarms	Masks USER-ETH alarms.	Masked **Unmasked**	Always

3. Select values for all the fields.
4. To choose the bandwidth of the USER-ETH port, select **Rate Limit**.

   The Rate Limit menu appears.

```
Configuration>Physical Layer>Ethernet>Rate Limit

 1. 0 Mbps
 2. 8 Mbps
 3. 16 Mbps
 4. 24 Mbps
 5. 32 Mbps

>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-15. Rate Limit Menu

5. Select **Alarms** to mask or unmask the Fast Ethernet alarms.
6. Select **Fault propagation** to toggle between **On** and **Off**.

   When fault propagation is **On**: if the active E3 port is at sync loss, frame loss, or AIS status, the USER-ETH port is shut down.

   When fault propagation is **Off**: faults will not be propagated.

Note *In order to establish connection between the Ethernet USER ports of two Optimux-34 units, it is necessary to disable an appropriate number of E1 ports according to the required connection bandwidth of the Ethernet link, starting from the first E1 port. To enable the Ethernet USER port, you must disable the first E1 ports, 1 to X. (1-4, 1-8, 1-12 or 1-16) according to the required bandwidth.*

Configuring the E3 Port

➤ To configure the E3 port:

1. From the Configuration menu, select Physical Layer› **E3**.

   The E3 menu is displayed.

```
Configuration>Physical Layer>E3

 1. Device Number              >   (Local)
 2. Port Number                    (LINK A)
 3. Port Name                  ... ()
 4. Alarms                         (Unmasked)

>
Please select item <1 to 4>
ESC-prev.menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-16. E3 Menu

Table 4-12 describes the Local and Remote Uplink menu (see *Figure 4-16*).

Table 4-12. E3 Values

Field	Description	Possible Values	Visibility
Device Number	The device number	Remote **Local**	Always
Port Number	E3 port number	LINK B **LINK A**	Always
Port Name	Sets a name for the port containing up to 15 characters.		
Alarms	Masks UpLink alarms	Masked **Unmasked**	Always

2. Select **Device Number** option and set the device to either **Local** or **Remote**.
3. Select **Port Number** to set the E3 port number to either **LINK A** or **LINK B**.
4. Select **Port Name** to set a name for the port.
5. Select **Alarms** to mask or unmask the Uplink alarms.

Configuring the E1 Port

The E1 option in the Physical Layer menu is for the configuration of the E1 ports.

➤ **To configure the E1 port:**

1. From the Configuration menu, select **Physical Layer› E1**.

   The E1 menu is displayed.

```
Configuration>Physical Layer>E1

 1. Device Number              >   (Local)
 2. Port Number[1-16]          ... (1)
 3. Administrative Status          (Up)
 4. Port Name                  ... ()
 5. Interface Type                 (Balance (120ohm))
 6. Alarms                         (Unmasked)

>
Please select item <1 to 6>
ESC-prev.menu; !-main menu; &-exit                      1 user(s)
```

Figure 4-17. E1 Menu

Table 4-13 describes the E1 fields in the menu (see *Figure 4-17*).

Table 4-13. E1 Values

Field	Description	Possible Values	Visibility
Device Number	The device number	Remote **Local**	Always
Port Number	E1 port number	**1** to 16	Always
Administrative Status	Port status	Up Down	Always
Port Name	Sets a name for the port containing up to 15 characters.		Administrative Status (Up)
Interface Type	Configures the interface to balance or unbalance	Unbalance (75Ω) **Balance (120Ω)**	Administrative Status (Up)
Alarms	Masks Tributary alarms	Masked **Unmasked**	Administrative Status (Up)

2. Select the **Device Number** option to set the device to either **Local** or **Remote**.
3. Select **Port Number** to set the E1 port number.
4. Select **Administrative Status** and set the status to either **Up** or **Down**.
5. Select **Port Name** to set a name for the port.
6. Select **Interface Type** and set to either **Balance (120Ω)** or **Unbalance (75Ω)**. Configure the channels in groups of eight only: Channels 1-8 or 9-16 only.
7. Select **Alarms** to mask or unmask the E1 alarms.

Configuring the V.35 Port

The V.35 option in the Physical Layer menu is for the configuration of the V.35 ports.

➤ **To configure the V.35 port:**

1. From the Configuration menu, select **Physical Layer> V.35**.

   The V.35 menu is displayed.

```
Configuration>Physical Layer>V.35

 1. Device Number                  >   (Local)
 2. Administrative Status              (Up)
 3. Port name                      ... ()
 4. Clock Source                   >   (Internal)
 5. DCD Status                     >   (Permanent ON)
 6. CTS Status                     >   (Permanent ON)
 7. DTE Loop Detection             >   (Disable)
 8. Alarms                             (Unmasked)

>
Please select item <1 to 8>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-18. V.35 Menu

Table 4-14 describes the V.35 fields in the menu (see *Figure 4-18*).

Table 4-14. V.35 Values

Field	Description	Possible Values	Visibility
Device Number	The device number	Remote **Local**	Always
Administrative Status	Port status	Up Down	Always
Port Name	Sets a name for the port containing up to 15 characters.		Administrative Status (Up)
Clock Source	Configures the interface Clock Source	**Internal** LBT External	Administrative Status (Up)
DCD Status	Configures the interface DCD Status When set to CONTROL, the DCD signal is set to ON when the active link is good (no signal loss, frame loss or AIS)	**Permanent ON** Control	Administrative Status (Up)
CTS Status	Configures the interface CTS Status When set to CONTROL, the CTS signal is set ON when RTS is ON.	**Permanent ON** Control	Administrative Status (Up)
DTE Loop Detection	Configures the interface DTE Loop Detection When set to Enable, loops originated by DTE are enabled.	**Enable** Disable	Administrative Status (Up)

Field	Description	Possible Values	Visibility
Alarms	Masks Tributary alarms	Masked **Unmasked**	Administrative Status (Up)

2. Select the **Device Number** option to set the device to **Local** or **Remote**.
3. Select **Administrative Status** option and set the status to **Up** or **Down**.
4. Select **Port Name** to set a name for the port.
5. Select **Clock Source** to set **Internal** or **LBT** (Loopback Timing) or **External** timing.
6. Select the **DCD** option to set the interface to **Permanent ON** or **Control**.
7. Select the **CTS** option to set the interface to **Permanent ON** or **Control**.
8. Select the **DTE Loop Detection** to mask or unmask DTE Loops.
9. Select **Alarms** to mask or unmask the V.35 alarms.

4.3 Performing Additional Tasks

Setting the User Name and Password

To enhance security, you can specify a user name and password to control access to the Optimux-34 management functions.

➤ **To set user name and password:**

1. Follow the path: **System** › **Management** › **Management Access** › **User Access**.

   The User Access menu is displayed.

2. From the User Access menu, select **Change Password**.

   The Change Password screen is displayed.

3. To change the password, select **Password** and then enter the new password. The new password may contain up to eight characters.

```
Configuration>System>Management>Management Access>User Access
>Change password

 1. User name                    … ()
 2. Password                     … (****)
 3. New password                 … (****)
 4. Confirm new password         …

Please Confirm New Password (Up To 8 Characters)

ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-19. Change Access Menu

4. To change the user name, select **User name** and then enter the new user name.

➤ **To view the user's access level:**

1. From the Management Access menu, select **User Access**.

   The User Access menu is displayed.

2. From the User Access menu, select **User Info**.

   The User Info menu is displayed.

```
Configuration>System>Management>Management Access>User Access
>User info

   User Name    Access level   Dynamic/Permanent
 1    USER           RO             Permanent
 2     SU            RW             Permanent

ESC-prev.menu; !-main menu; &-exit; ?-help            1 user(s)
```

Figure 4-20. User Info Menu

Resetting to Factory Defaults

You can reset all Optimux-34 configuration parameters to their default settings, or you can reset all parameters except for the management settings (IP addresses). The reset to default can be done in either of two ways:

- All parameters back to default values, or
- All parameters back to default values except for management parameters (IP address, mask and default gateway).

➤ **To reset parameters to the factory defaults:**

1. From the System menu, choose **Factory Default**.

   The Factory Default menu is displayed.

```
Configuration>System>Factory Default

 1. All
 2. W/O Management

>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-21. Factory Default Menu

2. To reset all parameters to the factory default, choose **All**. This will reset the factory default parameters of the local device.
3. To reset all parameters except for the management information to the factory default, choose **W/O MNG**. This will reset the factory default parameters of the local device. The Managers List and access will be set to

default but will not reset the IP address, IP mask, default gateway and communities.

A confirmation message is displayed.

4. Enter **Y** (Yes) to confirm the reset operation.

Viewing the Inventory

Optimux-34 provides details regarding the unit through the Inventory menu. It provides information on the boot, software and hardware version, device type, and information on the Optimux-34 interfaces.

Viewing the Local Optimux-34 Inventory

➤ To view the local Optimux-34 inventory:

1. From the Main Menu, select **Inventory**.

   The Inventory screen is displayed.

2. To see the next screen of the inventory press **N.**
3. To return to the previous page press **P.**

```
                              Optimux-34
Inventory

    Device type           >   (Optimux-34)
    Boot version          ... (1.13 mng 10.02)
    SW Version            ... (2.81)
    HW Version            ... (1.00/B  Firmware: E1E0 Ver. 2.82)
    Serial Number: ---    , Asset Id: ---

        INTERFACES INFORMATION
    E3 Link A             ... (LC 1310nm Inter. Reach SM, SFP)
      Vendor: LUMINENTOIC;  Part No.: SFP155IRIDA;  Rev: A
    E3 Link B             ... (Module not installed)

    E1 Ports 1-8          ... (RJ-45, Balance (120ohm))
... (N)
>
Please select item <1 to 1>
ESC-prev.menu; !-main menu; &-exit                                  1 user(s)
```

```
                              Optimux-34
Inventory

... (P)
    E1 Ports 9-16          ... (RJ-45, Balance (120ohm))
    V.35                   ... (ISO 2110)
    USER-ETH               ... (RJ-45, 10/100BaseT)
    MNG-ETH                ... (RJ-45, 10/100BaseT)
    Alarm Port             ... (DB-9)
    Control Port           ... (DB-9, RS-232)
    PS A Type              >   (AC/DC)
    PS B Type              >   (AC/DC)
 1. Device Number          >   (Local)

>
Please select item <1 to 1>
ESC-prev.menu; !-main menu; &-exit                                  1 user(s)
```

Figure 4-22. Inventory Screen for a Local Optimux-34 Unit

Note

- *If the SFP is not installed on the Optimux-34 unit, then the SFP information line will not be displayed on the Inventory screen.*
- *The dry contact information line appears only if dry contact is installed.*
- *V.35 is displayed only if the port is installed.*

Viewing the Remote Optimux-34 Inventory

➤ To view the inventory of an Optimux-34 remote device:

1. From the Main Menu, select **Inventory**.

   The Inventory screen is displayed.

2. To see the next screen of the inventory press **N.**
3. To return to the previous page press **P.**
4. Type **1** to change the Device Number to Remote.

```
                                Optimux-34
Inventory

    Device type           >   (Optimux-34)
    SW version            ... (2.81)
    HW version            ... (1.00/B  Firmware: E1E0 Ver. 2.82)

        INTERFACES INFORMATION
    E3 Link A             ... (OPTICAL)
    E3 Link B             ... (Module not Installed)
    E1 Ports 1-8          ... (RJ-45, Balance (120ohm))
    E1 Ports 9-16         ... (RJ-45, Balance (120ohm))
    V.35                  ... (ISO 2110)
    USER-ETH              ... (RJ-45, 10/100BaseT)
    MNG-ETH               ... (RJ-45, 10/100BaseT)
... (N)

>
Please select item <1 to 1>
ESC-prev.menu; !-main menu; &-exit                                  1 user(s)
```

```
Inventory

... (P)
    Alarm Port            ... (DB-9)
    Control Port          ... (DB-9, RS-232)
    PS A type             >   (AC/DC)
    PS B type             >   (AC/DC)
 1. Device Number         >   (Remote)

>
Please select item <1 to 1>
ESC-prev.menu; !-main menu; &-exit                                  1 user(s)
```

Figure 4-23. Inventory Screen of an Optimux-34 Remote Device

Table 4-15 describes the Device Number field in the Inventory menus (see *Figure 4-22* and *Figure 4-23*).

Table 4-15. Inventory Values

Field	Description	Possible Values	Visibility
Device Number	The device number. Configurable if connected to a remote device and unconfigurable when Optimux-34 is not connected to a remote device or when the remote device is not an Optimux device.	Remote **Local**	Always

Managing the License File

In order to activate the Ethernet User port, the license file must be downloaded and activated. A permanent license purchased does not expire. A demo license expires after 30 days.

Note *In order to establish connection between the Ethernet USER ports of two Optimux-34 units, it is necessary to disable an appropriate number of E1 ports according to the required connection bandwidth of the Ethernet link starting from the first E1 port. To enable the Ethernet USER port, you must disable the first E1 ports, 1 to X. (1-4, 1-8, 1-12 or 1-16) according to the required bandwidth.*

Checking the Firmware Version

From the Inventory, check the version of the firmware shown as **2.81** and proceed according to the steps in the following table:

Table 4-16. Hardware Version Actions

Hardware Version	Action
Is less than 2.31	The device does not support an Ethernet User port. Call *RAD Technical Support,* request an RMA, and return the device to RAD for a hardware upgrade. Do not continue with this procedure.
Equals 2.31	Upgrade the device software before downloading the license key. Press ‹**Esc**› to return to the Main Menu and go to *Chapter 6* to upgrade software.
Is 2.41 or higher	"Fast ETH USER" appears in the inventory. Press ‹**Esc**› to return to the Main Menu, skip to the section below, and perform the steps listed.

Downloading the License File

You can download the license file in either of two ways:

- TFTP when downloading over a network
- XMODEM when downloading over a dumb terminal connected to the Optimux-25 control port.

Downloading the License File Using TFTP

➤ **To download the license file using TFTP :**

1. From the Main menu, select **Utilities› File Utilities›** to observe the downloaded files and enable download and upload.
2. From the File Utilities menu, select **SW & File Transfer› TFTP** to download the key using TFTP.
3. Select **Server IP** and enter the IP address of the server to which the upload or download is operating.

4. Select **Remote File Name** and enter the license file name given to you by RAD. (The file name ends in .**txt**.)
5. Select **Command** and the Command Menu appears:

```
Utilities>File Utilities>SW & File Transfer>TFTP>Command

 1. No Operation
 2. Software Download
 3. Software Upload
 4. Configuration File Download
 5. Configuration File Upload
 6. License File Download

>
Please select item <1 to 6>
ESC-prev. menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-24. Command Menu

6. Select **License File Download**.

   The license file downloads from RAD to the device.

7. Press ‹**Esc**› to return to the TFTP menu. The Transfer Status field tracks the progress of the downloading file.

Downloading the License File Using XMODEM

➤ **To download the License File using XMODEM:**

1. From the Main menu, select **Utilities› File Utilities› S/W & File Transfer**.
2. From the S/W & File Transfer menu, select **License File Download**.

   The license file downloads from RAD to the device.

Activating the License File

➤ **To Activate License File:**

1. After downloading the file as described above, go to the Utilities menu, select **License Management**.

   The License Management menu appears:

2. Select **Feature Status** to show the status of the Ethernet User port.

   The Feature Status menu appears:

```
Utilities>License Management>Feature Status

    USER-ETH Data Port            ... (Enabled)

>
ESC-prev.menu; !-main menu; &-exit                   1 user(s)
```

Figure 4-25. Feature Status Menu

Table 4-17. USER-ETH port status

Status	Description
Enabled	the USER-ETH port is open and enabled
Disable	the USER-ETH port is disabled
Expired	the license for this port has expired. New license is needed to enable this port
N day	the number of days left for the present license to expire. This option is for demo license

Verifying that the User Ethernet Port is Active

➤ To verify that the User Ethernet port is active:

1. In the Utilities menu, select **License Management**.

   The License Management menu appears:

```
Utilities>License Management

 1. Feature Status

>
Please select item <1 to 1>
ESC-prev. menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-26. License Management Menu

2. Select **Feature Status** to display the status of the Ethernet User port.

   The Feature Status screen appears:

```
Utilities>License Management>Feature Status

 ETH Data Port                      ... (Enabled)

>
ESC-prev. menu; !-main menu; &-exit                    1 user(s)
```

Figure 4-27. Feature Status Screen

The status of the Ethernet User port is explained in *Table 4-18*:

Table 4-18. ETH-USER Port Status

Status	Description
Enabled	The ETH-USER port is open and enabled
Disabled	The ETH-USER port is disabled
Expired N day	The number of days left for the present license to expire. This status is for a demo license.

Note *If you have purchased and downloaded a license and the Ethernet User port status is not **Enabled** or you have downloaded a demo license and the status is not **Expired N day**, contact RAD Technical Support.*

Viewing Software File Info and Swapping Software

➤ To view information about the file system:

1. From the Utilities menu, select File Utilities › File System.

   The File System menu is displayed.

   The File System Options are:

   - SW Files – displays the stored software files
   - Swap SW Files – is the command to SWAP between the stored software files.

2. From the File System menu, select SW Files.

   The SW Files screen is displayed, showing information about the main and backup versions.

```
Utilities>File Utilities>File System>SW Files

  Software active version          2.81
  Software active partition          0
  Code size                       470716
  Date <dd-mm-yy>                dd-mm-yy
  Software backup version         0.00n00
  Software backup partition          1
  Code size                          0
  Date <dd-mm-yy>                dd-mm-yy
  Boot version                     1.13
  Boot mng version                 10.02

>
ESC-prev. menu; !-main menu; &-exit                        1 user(s)
```

Figure 4-28. SW Files Screen

➤ To swap the active and backup software partitions:

1. From the File System menu, select SWAP SW Files.
2. Enter Y (Yes) to confirm the software files swap operation.

Note *After swapping files, the system will reset itself.*

Chapter 5

Monitoring and Diagnostics

5.1 Monitoring Performance

Monitoring the Optimux-34 System

Aspects of both the local and the remote Optimux-34 systems can be monitored.

➤ To access the monitoring options:

1. From the Main menu, select **Monitoring**.

   The Monitoring menu is displayed.

2. To monitor the system, select **System**.

   The System menu is displayed.

```
Monitoring>System

    MAC address                (0020D222E15F)
    Sys Up Time                (0 days 05:06:34)

 1. Active Alarms              []
 2. Event Log                  []
 3. Status                      >
 4. Interface Status           []
 5. Clear Log file

>
Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 5-1. System Menu

Viewing the Active Alarms

The Active Alarms details can be displayed. Active masked alarms are displayed with masked status but the trap is not sent and dry contact is not activated.

➤ To view the active alarms:

- From the System menu, select **Active Alarms**.

  The Monitoring menu is displayed.

```
Monitoring>System>Active Alarms

     Source          Description                    Status
   1 Local Device    PS A FAIL                      Unmasked
|  2 Local Device    Redundancy not available       Unmasked
V  3 Local E3 A      Signal Loss                    Unmasked
   4 Remote port 5   RX AIS                         Unmasked

>
ESC-prev.menu; !-main menu; &-exit; ?-help          1 user(s)
```

Figure 5-2. Active Alarms Screen

Table 5-1 describes the source values in the Active Alarms screen (see *Figure 5-2*).

Table 5-1. Active Alarms Source Values

Field	Description
Device	For system level alarms
Local E3 #	For local device uplink
Remote E3 #	For remote device uplink
Local port #	For local device E1 port
Remote port #	For remote device E1 port
Local USER-ETH	For local device USER-ETH port
Remote USER-ETH	For remote device USER-ETH port
Local MNG-ETH	For local device MNG-ETH port
Remote MNG-ETH	For remote device MNG-ETH port

Event Log

➤ To view the Event Log:

- From the System menu, select **Event Log**.

  The Event Log menu is displayed.

```
Monitoring>System>Event Log

     Source       Alarm                        Status   Severity
   1 LOC device   PS A FAIL                    ON        MAJOR
   2 LOC MNG-ETH  Integrity Loss               ON        MAJOR
|  3 LOC device   Redundancy not available     ON        MAJOR
V  4 LOC port 1   Signal Loss                  ON        MAJOR
   5 LOC port 2   Signal Loss                  ON        MAJOR
   6 LOC port 3   Signal Loss                  ON        MAJOR
   7 LOC port 4   Signal Loss                  ON        MAJOR
   8 LOC port 6   Signal Loss                  ON        MAJOR
   9 LOC port 7   Signal Loss                  ON        MAJOR
  10 LOC port 8   Signal Loss                  ON        MAJOR
   ->>

>
ESC-prev.menu; !-main menu; &-exit; ?-help          1 user(s)
```

Figure 5-3. Event Log Screen

There can be up to 200 entries stored in the log file.

System Status

➤ To view the system status:

- From the System menu, select **Status**.

  The Status screen is displayed.

```
Monitoring>System>Status

 1. Device Number     > (Local)
    Device Type       > (Optimux-34)
    Force Link        > (LINK A)
    Active Link       > (LINK A)
    Redundancy mode   > (AUTO)
    Redundancy status > (Available)
    Clock source      > (Internal)
    PS A Status       > (OK)
    PS B Status       > (Not mounted)
    Alarm indication  > (Major)
    Test indication   > (Off)

ESC-prev.menu; !-main menu; &-exit                  1 user(s)
```

Figure 5-4. Status Screen

- **Device Number** - The Optimux-34 device number. The number is configurable if connected to a remote device and not configurable when Optimux-34 is not connected to a remote device or when the remote device is not an Optimux device. The device number is always visible with one of the following values:
  - Local (default)
  - Remote.

Interface Status

➤ To view the interface status:

1. From the System menu, select Interface Status.

   The Interface Status screen is displayed.

```
Monitoring>System>Interface Status

     Description    Type       Admin      Operation    Speed
   1 Loc uplink A    E3         NA          Down      34368000
   2 Loc uplink B    E3         NA          Down      34368000
|  3 Loc Port 1      E1         Up          Down       2048000
v  4 Loc Port 2      E1         Up          Down       2048000
   5 Loc Port 3      E1         Up          Down       2048000
   6 Loc Port 4      E1         Up          Down       2048000
   7 Loc Port 5      E1         Up          Down       2048000
   8 Loc Port 6      E1         Up          Down       2048000
   9 Loc Port 7      E1         Up          Down       2048000
  10 Loc Port 8      E1         Up          Down       2048000

>
ESC-prev.menu; !-main menu; &-exit; ?-help           1 user(s)
```

Figure 5-5. Interface Status Screen

2. To clear the log file, select from system screen "Clear log file".
3. Enter Y (Yes) to confirm.

Monitoring the Physical Ports

You can monitor the following physical ports of the Optimux-34:

- Ethernet
- E3
- E1
- V.35.

➤ To monitor the physical ports:

- From the Monitoring menu, choose Physical Layer.

  The Physical Layer menu is displayed.

Note *V.35 is visible only when the port is installed.*

➤ To display the status of the Ethernet port:

1. From the Monitoring menu, select Physical Layer›Ethernet.

   The Ethernet screen is displayed.

```
Monitoring>Physical Layer>Ethernet

 1. Device Number                 >   (Local)
 2. Port Number                   >   (MNG-ETH)
    Operation                     >   (Up)
    Autonegotiation Status        >   (Complete)
    Speed & Duplex Status         >   (100Base-TX Full Duplex)
    Alarms                        >   (Unmasked)

>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 5-6. Physical Layer Ethernet Screen

2. To see the USER-ETH status, select **2** and then USER-ETH port (**2**).
3. To see the remote Ethernet status, select **1** and then Remote (**2**).

Table 5-2. Physical Layer Ethernet Fields

Field	Description
Device number	Local or remote device information
Port number	Ethernet Management or Ethernet User port information
Operation	Link up or down
Autonegotiation	Auto Negotiation status Complete, Not Complete, or Disable
Speed and Duplex	10Base-T or 100Base-TX and Full Duplex or Half Duplex
Alarms	the Alarms to the ETH port status (Masked/Unmasked).

➤ To display the status of the E3 port:

- From the Physical Layer menu, select **E3**.

  The E3 screen is displayed.

```
Monitoring>Physical Layer>E3

 1. Device Number                 >   (Local)
 2. Port Number                   >   (LINK A)
    Operation                     >   (Up)
    Alarm Indication              >   (Normal)
    Test Indication               >   (Off)
    Alarms                        >   (Unmasked)

>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 5-7. Physical Layer E3 Screen

➤ To display the status of the E1 port:

- From the Physical Layer menu, select **E1**.

The E1 screen is displayed.

```
Monitoring>Physical Layer>E1

 1. Device Number                 >   (Local)
 2. Port Number[1 - 16]           >   (1)
    Administrative Status         >   (Up)
    Operation                     >   (Up)
    Alarm Indication              >   (Normal)
    Test Indication               >   (Off)
    Alarms                        >   (Unmasked)

>
Please select item <1 to 2>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 5-8. Physical Layer E1 Screen

➤ To display the status of the V.35 port:

- From the Physical Layer menu, select **V.35**.

  The V.35 screen is displayed.

```
Monitoring>Physical Layer>V.35

 1. Device Number                 >   (Local)
    Administrative Status         >   (Up)
    Operation                     >   (Up)
    Alarm Indication              >   (Normal)
    Test Indication               >   (Off)
    Alarms                        >   (Unmasked)

>
Please select item <1 to 1>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 5-9. Physical Layer V.35 Screen

Note *V.35 is visible only if the port is installed.*

5.2 Detecting Errors

➤ To perform diagnostic loops:

- From the Main menu (see *Figure 4-2*), choose **Diagnostics**.

  The Diagnostics menu is displayed (see *Figure 5-10*).

```
                              Optimux-34
Diagnostics

 1. Device Number                              >    (Local)
 2. E3 Loop Type                               >    (No Loop)
 3. E3 LLB Loop timeout(min)[1 - 255]          ... (5)
 4. Port Loops                                 []>
 5. Clear all Port loops

>
Please select item <1 to 5>
ESC-prev.menu; !-main menu; &-exit                          1 user(s)
```

Figure 5-10. Diagnostics Menu

Loop Connections

Optimux-34 supports loop connections necessary for isolating a failure to a particular component of the transmission system. The loop connections are set using a management tool connected to one of the management ports of the unit.

The available Optimux-34 loop connections are shown in *Figure 5-11*, and the diagnostic loops are shown in *Table 5-3*.

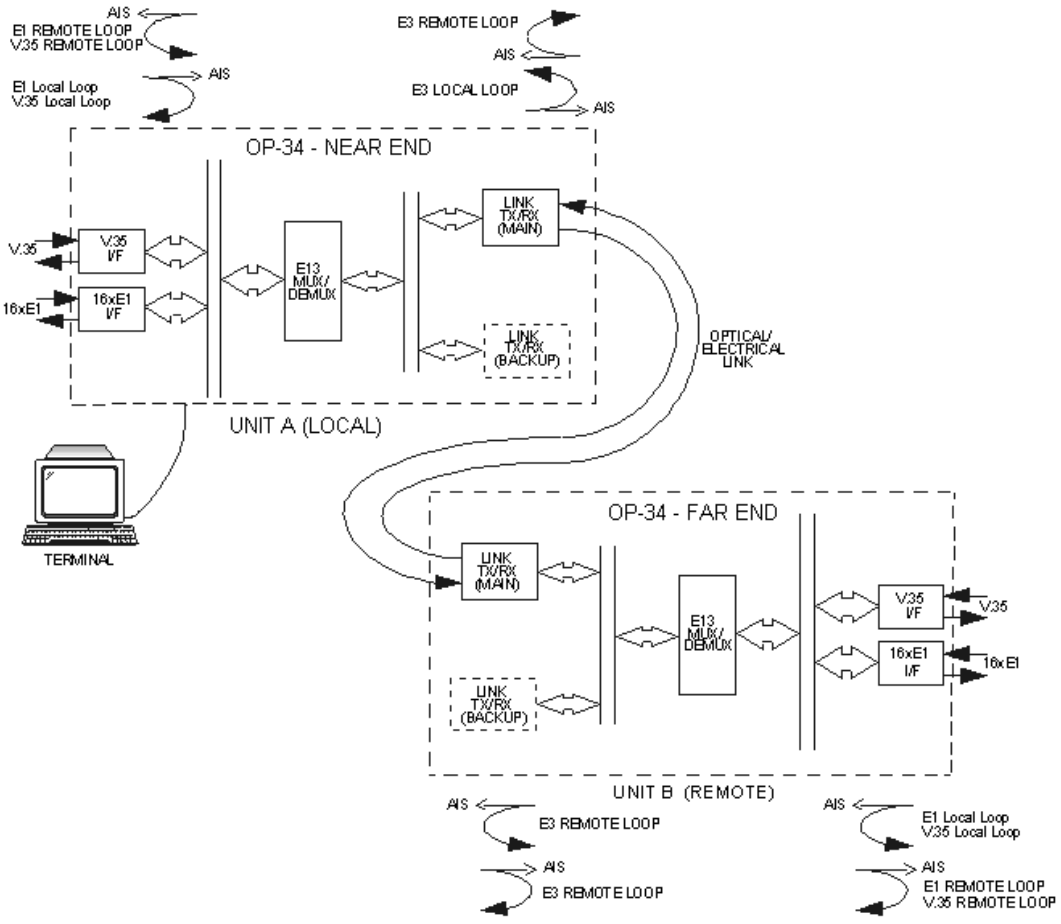


Figure 5-11. Optimux-34 Loops

Table 5-3. Diagnostic Loops

Loop	Function
E1 local	An incoming E1 signal is looped back to the E1 line. AIS is injected towards the E13.
E1 remote	The received E1 signal is looped back towards the link. AIS is injected in the E1 signal towards the E1 line.
E3 local	The outgoing E3 signal is looped back towards the E1 port. Unframed AIS (all 1's) is injected in the outgoing E3 signal towards the link and propagated to the E1 signals in the remote Optimux-34.
E3 remote	The received E3 signal is looped back towards the link. AIS is injected in the E1 signal towards the E1 line.
V.35 local	An incoming V.35 signal is looped back to the V.35 line. ***Note***: *This loop can be activated by the user or from the external DTE connected to the V.35 interface.*
V.35 remote	The received V.35 signal is looped back towards the link. ***Note:*** *This loop can be activated by the user or from the external DTE connected to the V.35 interface.*

Notes

- *Before setting the E3 local loop, set the clock source to INT.*
- *V.35 loops can be set via the supervisory terminal/MNG station or by the external DTE connected to the V.35 interface. When set by external DTE, this loop can be deactivated only by the DTE.*

E1, V.35, and E3 Loops on the Remote Unit

E1, V.35, and E3 loops can be performed on the remote unit in the same way as on the local unit.

➤ To perform an E1, V.35, or E3 loop on the remote unit:

- Set the Device Number as Remote from the Diagnostics menu, while the terminal or network management station (NMS) is connected to the local unit.

Notes

- *Before initiating loops using the DCE, Optimux-34 must be in No Loop state. Otherwise, the command will be cancelled.*
- *Once the DCE initiates the loop, it must also cancel it. Any attempt to cancel the loop using the Optimux-34 will be ignored.*
- *If a loop is initiated via the DCE pins, it can be deactivated only by the DCE. Optimux-34 ignores any attempt to deactivate this loopback via the supervisory terminal.*

Setting Loopbacks in the Optimux-34

The local loopback (LLB) timeout can be set for the local device and for the remote device.

➤ **To set the timeout for the Local Loopback:**

1. Select Loop Timeout.
2. Enter the timeout value in minutes. The value you specify is the duration of the link loopback test. The maximum timeout duration value is 255 minutes.

➤ **To perform E1 or V.35 loopbacks:**

1. Select the **Port Loops** option to access the set up screen for the Loopback tests.

   The **Port Loops** screen is displayed.

```
Diagnostics>Port Loops

          Number   Loop        Number   Loop

     1    E1 - 1   LLB         E1 - 2   No loop
     2    E1 - 3   No loop     E1 - 4   No loop
|    3    E1 - 5   No loop     E1 - 6   No loop
v    4    E1 - 7   No loop     E1 - 8   No loop
     5    E1 - 9   No loop     E1 - 10  No loop
     6    E1 - 11  No loop     E1 - 12  No loop

 1. No Loop
 2. LLB
 3. RLB

>
Please select item <1 to 3>
ESC-prev.menu; !-main menu; &-exit                    1 user(s)
```

Figure 5-12. E1/V.35 Loop Screen

2. Use the **Tab** key to select next changeable cell to highlight the Loop status field of the channel you want to change.
3. Enter the loopback status you want to set:

<1> No Loop	No loopback on the channel
<2> LLB	Local Loopback on the channel
<3> RLB	Remote Loopback on the channel

See *Chapter 5* for definitions of E1 and E3 link loopbacks.

Caution Setting the E3 link local loopback in the local Optimux-34 disconnects the E3 link to the remote device.

Note *Port 16 can be set to either E1 or V.35. When the V.35 port is activated, loops for the V.35 port can only be set to port 16.*

5.3 Troubleshooting

In case a problem arises, check the displayed indications and using this section and the *Optimux-34 Front Panel Controls* table attempt to interpret and solve.

Identify the trouble symptoms and perform the actions listed under "Corrective Measures" in the order given in *Table 5-4*, until the problem is solved.

Table 5-4. Troubleshooting Chart

Trouble Symptoms	Probable Cause	Corrective Measures
Optimux-34 is "dead".	No power	Check that both ends of the power cable are properly connected.
	Blown fuse	1. Disconnect the power cable from both ends. 2. Replace the fuse with another fuse of the same rating.
	Defective Optimux-34	Replace Optimux-34.
One of the PWR LEDs is red.	Power connection	Check the connection of the power cable.
	Blown fuse.	Replace the fuse with another fuse of the same rating.
	Defective power supply	If the PWR LED is still RED, have the Optimux-34 repaired as soon as possible.
The LINK SYNC LOSS LED is ON	Defective Optimux-34	1. Set the clock source to INT. 2. Loop the link connection with a short fiber / coax. 3. If the LED is still ON replace the link. 4. If the LED is still ON have the Optimux-34 repaired.
	External problem	Check the link connections. Use loopback connections to isolate the faulty unit (see *Loop Connections* on page *5-7*).
The LINK AIS LED is ON	External problem	The remote equipment connected to the E3 link of Optimux-34 sends an AIS sequence. Check the remote equipment.
	Defective Optimux-34	1. Set the clock source to INT. 2. Loop the link connection with a short fiber/coax. 3. If the LED is still ON have the Optimux-34 repaired.
All the units connected to a local Optimux-34 do not receive signal from the remote equipment.	External problem	1. Activate the E3 local loop on the Optimux-34. 2. Check that all the SYNC LOSS and AIS indicators turn OFF, and that the equipment connected to the local channels receives their own transmissions. 3. If the indicators turn OFF, the problem is external. Troubleshoot the remote unit, and the E3 transmission path.
	Defective Optimux-34	Replace Optimux-34

Only one of the units connected to a local Optimux-34 does not receive signal from the remote equipment.	Connection problem	Check the equipment connected to the local channel
	External problem	1. Activate the port local loop on the Optimux-34. 2. Check that any previously lit alarm indicators related to the channel turn OFF. 3. If the indicators turn OFF, the problem is external. Check the remote equipment.
	Defective Optimux-34	Replace Optimux-34
SYSTEM FLT indicator is ON	Defective Optimux-34	Replace Optimux-34
V.35 interface does not transfer data	External problem	Check the interface connections.
	Configuration problem	1. Check that the V.35 port is activated and set to Up. 2. Check clock settings on both ends.

5.4 Frequently Asked Questions

Q: What is the relationship between the main link (E3) and the tributary clock?

A: In PDH technology, the E1 clock and the main link clock are not related at all. This means that a product can multiplex several E1s with completely different timings over any kind of main link (E2, E3, T3, etc.), while the E1 clock is regenerated at the other end, no matter what the main link clock is. This is by definition PDH technology.

Since the Optimux is a PDH multiplexer, you can work an Internal clock opposite an Internal clock (a frame clock such as E3) without any problem. The E1 is transmitted transparently from one side to the other. The purpose of internal, external, and loopback timing is only to synchronize the framer (that is the main link).

Internal, external, and loopback timing clocks are needed to create the framer clock. However, they have no influence on the E1 but only on the E3 framer rate. It means that no clock relation is needed between two Optimux units.

Both Optimux units can work in Internal clock without affecting the E1 clock. This means that the E1 on side B will be exactly the same as on side A (the same synchronization, the same timing). Actually, the loopback timing option is not needed for a point-to-point application.

You can always configure both Optimux units in the Internal clock, and the E1/T1 will always pass through the remote Optimux transparently. In other words, we can see the Optimux family as a cable. No special configuration is required to work with the Optimux, it is a plug-and-play product.

Q: How long does it take to switch between the Main and Backup links?

A: Officially less than 50 ms. According to our tests, the switching time between links is less than 40 ms.

5.5 Technical Support

Technical support for this product can be obtained from the local authorized RAD partner from whom it was purchased.

For further information, please contact the authorized RAD partner nearest you or one of RAD's offices worldwide. This information can be found at www.rad.com (**Offices – About RAD > Worldwide Offices; distributors – Where to Buy > End Users**).

Chapter 6

Software Upgrade

Software upgrade is required to fix product limitations, enable new features, or to make the unit compatible with other devices that are already running the new software version.

The Optimux-34 stores up to two versions of the software – each one is a separate partition.

The information includes the following:

- Detailed conditions required for the upgrade
- Any impact the upgrade may have on the system
- Overview of downloading options
- Upgrade via the File Utilities menu
- Upgrade via the Boot menu.

6.1 Compatibility Requirements

Following are the software releases that can be upgraded to a new version. The hardware revisions that can accept the new software version are also listed.

- Software – 2.0 and above
- Hardware – 1.0 and above.

6.2 Impact

Optimux-34 resets automatically after the software upgrade, resulting into up to two minutes of downtime. Upgrade to the new version does not affect any user settings.

6.3 Software Upgrade Options

Application software can be downloaded to Optimux-34 via the TFTP menu (Main Menu›Utilities›File Transfer›TFTP), or via the Boot menu, using XMODEM or TFTP.

6.4 Prerequisites

This section details the Optimux-34 software and versions compatible with the new version. It also lists the software file names and outlines system requirements needed for the upgrade procedure.

Software Files

The new version releases are distributed as software files named **OP-34.img**. The files can be obtained from the local RAD business partner from whom the device was purchased.

System Requirements

Before starting the upgrade, verify that you have the following:

- For upgrade via TFTP:
  - Operational Optimux-34 unit with valid IP parameters configured for the host
  - Connection to a PC with a TFTP server application (such as 3Cdaemon or PumpKIN), and a valid IP address
  - Software file (**OP-34.img**) stored on the PC
- For upgrade via XMODEM:
  - Operational Optimux-34 unit
  - Connection to a PC with a terminal emulation application (such as HyperTerminal)
  - Software file (**OP-34.img**) stored on the PC.

6.5 Upgrading Optimux-34 Software via the File Utilities Menu

The recommended software downloading method is downloading by means of the TFTP, using the *Download/upload using TFTP* menu reached from the File Utilities menu.

Network administrators can use this procedure to distribute new software releases to all the managed Optimux-34 units in the network from a central location.

Use the following procedure to download the new software release to Optimux-34 via the File Utilities menu.

1. Verify that the (**OP-34.img**) is stored on the PC with the TFTP server application.
2. Verify that the Optimux-34 host has valid IP parameters.
3. Ping the PC to verify the connection.

4. Activate the TFTP server application.
5. Download the (**OP-34.img**) from the PC to Optimux-34.

Note *Configuration values shown in this chapter are examples only.*

Verifying the Optimux-34 Host Parameters

The Optimux-34 host must have host IP parameters configured according to your network requirements. Otherwise you will not be able to establish a proper communication session with the TFTP server. Refer to the following manual section for additional information:

- *Connecting to the ASCII Terminal* in Chapter 2
- *Working with Terminal* in Chapter 3
- *Configuring IP Host Parameters* and *Configuring the Host Encapsulation* in *Chapter 4*.

➤ **To verify the Optimux-34 host parameters:**

- Display the Host IP menu (Configuration›System Configuration›Management ›Host IP), and verify that the host IP address, IP mask and default gateway are configured according to your network requirements.

```
                          Optimux-34
Host IP

Host IP address                  (172.17.161.73)
Host IP mask                     (255.255.255.0)
Host default gateway             (172.17.161.1)
Read community                   (public)
Write community                  (public)
Trap community                   (public)

>
ESC-prev. menu; !-main menu; &-exit; @-scroll
```

Figure 6-1. Configuring the Host

Activating the TFTP Server

Once the TFTP server is activated on the PC, it waits for any TFTP file transfer request originating from the product, and carries out the received request automatically. *Transferring Software and Configuration Files* section in *Chapter 4* explains how to prepare your PC for the TFTP file transfer.

➤ **To run the TFTP server:**

- Activate a TFTP server application, such as **3Cdaemon** (available from www.3com.com) or **PumpKIN** (available from http://kin.klever.net/pumpkin/).

Downloading the New Software Release File to Optimux-34

This section presents procedures for installing new software releases into Optimux-34, as well as swapping existing software versions. The Optimux-34 system software is stored in nonvolatile memory. There are two memory partitions (referred to as 0 and 1) in which to store a set of software files. The software is stored in compressed format. The active version is decompressed and loaded into the Optimux-34 RAM upon power-up. The passive software is kept for backup purposes. The user can select which partition is active and which serves as backup. Optimux-34 is shipped with one active partition and a backup partition with the same software. Each time software is downloaded, it automatically becomes the active software, while the previously installed version becomes the backup software. The previous active partition becomes backup (with its previous version of the software).

Optimux-34 stores two software versions, each of them in one of the two partitions of its flash memory, which also contains a boot program. The software is stored in compressed format. The active version is decompressed and loaded into the Optimux-34 RAM upon power-up. The passive software is kept for backup purposes. By default, Optimux-34 is delivered with the active software only.

New software releases as an ***.img** file, which is downloaded to the local Optimux-34 using the TFTP or XMODEM protocol. Upon downloading, the new software release becomes active, the former active software turns into backup, and the former backup is erased.

If a failure occurs during downloading or decompression, the new version is erased from the flash and the backup version becomes active. In this case, only one version is left stored in the flash memory. If the active software becomes corrupted, you can replace it with its backup.

This procedure is used to replace the current software version with the new software release (**OP-34.img**).

Downloading a New Software Release via TFTP

➤ **To download the new software release file via TFTP:**

1. From the SW & File Transfer menu, select **TFTP** (*Figure 6-3*) (Main menu › File Utilities › SW & File Transfer › SW Download › TFTP).

```
                          Optimux-34
Utilities>File Utilities>SW & File Transfer>TFTP

 1. Server IP                    ... (0.0.0.0)
 2. Remote File Name             ... (-)
 3. Command                      >   (No Operation)
    Transfer Status              >   (No operation)
    Transfer Error               >   (No error)

>
Please select item <1 to 3>
ESC-Previous menu; !-Main Menu; &-Exit                  1 User(s)
```

Figure 6-2. TFTP Menu

Once an IP address is inserted, the "Command" line appears.

Table 6-1. TFTP Values

Field	Description	Possible Values	Visibility
Transfer Status	Status of the TFTP download.	**No operation** Connecting Transferring data Ended on Timeout Ended OK Error	Always
Transfer Error	Error code when the TFTP status has an error.	Unavailable (no hot IP) No error (default) File not found Illegal TFTP operation Unknown transfer ID Illegal PDU size Illegal file mode No empty connection No empty UDP port Server overflow	Always
Server IP	IP address of the server to which the upload or the download is operating.	**0.0.0.0** to 255.255.255.255	Always
Remote File Name	File name to download from or to upload to. The file name can have a string of up to 40 characters.	**NULL**	Always
Command	Command menu to select upload or download.	**No operation** Software download Software upload Configuration file download Configuration file upload License file download	Only when the user sets an IP address and a file name. When the Status is not Connecting or Transferring data and there is no download active via the XMODEM

2. From the TFTP menu, perform the following steps:
    1. Choose **Server IP** and enter the IP address of the server from which you want to download the new software file.
    2. Choose **Remote File Name** and enter the license file name given to you by RAD. (The file name ends in .**txt**.).
    3. Choose **Command.**

4. From Command menu, choose **Software download**.

   The download process begins.

   The Transfer Status field indicates the current status of the download.

Downloading a New Software Release via XMODEM

Notes

- *Software downloading via XMODEM cannot be executed from the Telnet or Web application, and will therefore not appear on a Telnet monitoring screen.*
- *To minimize the software downloading time, it is recommended to configure the CONTROL port to the highest available data rate.*

➤ **To download a new software release via XMODEM:**

1. From the Main menu, follow the path **Utilities› File Utilities› SW & File Transfer › XMODEM**.

   Optimux-34 responds with the following string:

   PLEASE OPEN XMODEM APPLICATION.

   For exit press Q(uit)

   If you press **‹Q›**, Optimux-34 aborts the download process and displays **Download failure. Press Esc to continue.** message in addition to the previous display.

2. Send the ***.img** file to Optimux-34 using the XMODEM protocol of your terminal application.

   Once downloading is complete, Optimux-34 decompresses the release file, displaying the following message:

   Final process download. Reset device after 5 seconds

   After the decompression, Optimux-34 is automatically reset. This causes the new software to be loaded into the modem's RAM.

Note *You need to run an X-Modem application on the remote computer to invoke the download.*

6.6 Upgrading Optimux-34 Software via the Boot Menu

Software downloading may also be performed using the Boot menu. The Boot menu can be reached while Optimux-34 performs initialization, for example, after power-up.

You may need to start the loading from the Boot menu when it is not possible to activate TFTP from the Download/upload using TFTP menu (for example, because the Optimux-34 software has not yet been downloaded or is corrupted).

Caution The Boot menu procedures are recommended only for use by authorized personnel, because this menu provides many additional options that are intended for use only by technical support personnel.

Two software downloading options are available from the Boot menu:

- Downloading using the XMODEM protocol. This is usually performed by downloading from a PC directly connected to the CONTROL port of the unit.
- Downloading using the TFTP. This is usually performed by downloading from a remote location that provides an IP communication path to an Ethernet port of Optimux-34.

Using the XMODEM Protocol

Use the following procedure to download the new software release to Optimux-34 via XMODEM.

Verify that the *.img file is stored on the PC with the terminal application.

1. Configure the communication parameters of the selected PC serial port for asynchronous communication for 115.2 kbps, no parity, one start bit, eight data bits and one stop bit. Turn all types of flow control off.
2. Turn off Optimux-34.
3. Activate the terminal application.
4. Turn on Optimux-34 and immediately start pressing the **‹Enter›** key several times in sequence until you see the Boot screen. A typical screen is shown below (the exact version and date displayed by your Optimux-34 may be different).

Note *If you miss the timing, Optimux-34 performs a regular reboot process (this process starts with* ***Loading*** *and ends with a message to press* ***‹Enter›*** *a few times to display the log in screen).*

```
RAD Optimux-34 Boot Version 1.00 (Nov 9 2004)
RAD Boot Manager Version 7.01 (Nov 9 2004)

0 - Exit Boot-Manager
1 - Dir
2 - Set Active Software Copy
3 - Delete Software Copy
4 - Download Files or an Application by XMODEM
5 - Format flash
6 - Show basic hardware information
7 - Reset board
8 - System Configuration.
9 - Download an Application by TFTP
Press the ESC key to go back to the Main Menu.
Select:
```

Figure 6-3. Boot Manager Menu

➤ **To download software release via XMODEM:**

1. From the Boot menu, select **Download an Application by XMODEM**. You will see a message that requests the partition number to which the new software is to be downloaded, and offers a recommended value.
2. If there is no special reason to select a different value, type the recommended number and then press <Enter>. A typical display is shown below:

```
Select Copy number for download ( 1 )
Select: 1
```

3. The process starts, and you will see:

```
Erasing Partition please wait ....
Please start the XMODEM download.
```

4. Start the transfer in accordance with the program you are using. For example, if you are using the Windows HyperTerminal utility:
   - Select **Transfer** in the HyperTerminal menu bar, and then select **Send File** on the **Transfer** menu.

     The **Send File** window is displayed:
     - Select the prescribed Optimux-34 software file name (you may use the **Browse** function to find it).
     - In the **Protocol** field, select **XMODEM.**
   - When ready, press **Send** in the **Send File** window. You can now monitor the progress of the downloading in the **Send File** window.

Note *If downloading fails, repeat the whole procedure.*

5. When the downloading process is successfully completed, you will see a sequence of messages similar to the following:

```
Loading ...
Decompressing to RAM.

Processing archive: FLASH
Extracting OPTIMUX.BIN
.....................................................
..................................................................... CRC OK
Running ...
*****************************************************************
* In order to start working - press the ENTER button for few times*
*****************************************************************
```

6. At this stage, press the **<Enter>** key several times to go to the log in screen.

Using the TFTP

Use the following procedure to download software release to Optimux-34 via TFTP.

1. Verify that the *.img file is stored on the PC with the TFTP server application.
2. Define IP parameters via the Boot Manager menu.
3. Activate the TFTP server application.
4. Download the *.img file from the PC to Optimux-34.

➤ **To define IP parameters via the Boot Manager menu:**

1. From the Boot Manager menu (*Figure 6-4*), select **System Configuration** to start the configuration of the Optimux-34 IP communication parameters, as needed for TFTP transfer.

   The parameters are displayed in consecutive lines. For each parameter, you can accept the current values by simply pressing **<Enter>** to continue, or type a new value:

   - **IP Address**: used to select the IP address of Optimux-34. To change the current value, type the desired IP address in the dotted quad format, and then **<Enter>** to continue.
   - **IP Mask**: used to select the IP subnet mask of Optimux-34. To change the current value, type the IP subnet mask address in the dotted quad format, and then **<Enter>** to continue.
   - **Default Gateway Address**: when the TFTP server is located on a different LAN, you must define the IP address of the default gateway to be used by Optimux-34. Make sure to select an IP address within the subnet of the assigned Optimux-34 IP address. To change the current value, type the desired IP address in the dotted quad format, and then **<Enter>** to end the configuration.

     If no default gateway is needed, for example, because the TFTP server is attached to the same LAN as Optimux-34 being loaded, enter **0.0.0.0**.

2. Press **<Enter>** to display the Boot menu.
3. Select **Perform Reset to the board** to reset Optimux-34. The new parameters take effect only after the resetting is completed.

➤ **To download software from the Boot menu using TFTP:**

1. From the Boot menu, select **Download an Application by TFTP** and then press **<Enter>** to start the TFTP transfer.

   Please Enter the Target File Name message is displayed.

2. Enter the name of the desired software distribution file (make sure to include the path, when necessary). When done, press **<Enter>** to continue.

   Please Enter the Server IP address message is displayed.

3. Enter the IP address of the server on which the software distribution file resides and then **<Enter>** to continue.

   If no errors are detected, the downloading process starts, and the screen displays its relative progress.

4. After the transfer is successfully completed, return to the Boot menu and select **Exit Boot-Manager**.

   When the Optimux-34 initialization is ended, the unit loads the new software.

Note *If downloading failed, repeat the whole procedure.*

Appendix A
Pinouts

A.1 E1 Interface

RJ-45 Pinouts

The E1 module has two types of connectors: RJ-45 and BNC using the RJ-45 to BNC adapter cable (CBL-RJ45/2BNC/E1/X). The RJ-45 E1 pin assignment is indicated in *Table A-1*. Each of the tributary E1 connectors has the same pinout.

Table A-1. E1 RJ-45 Connector Pin Assignment

Pin	Designation	Function	Direction
1	RRING1	Receive Data (Ring) 1	Input
2	RTIP1	Receive Data (Tip) 1	Input
4	TRING1	Transmit Data (Ring) 1	Output
5	TTIP1	Transmit Data (Tip) 1	Output

CBL-RJ45/2BNC/E1/X Adapter Cable

When Optimux-34 is ordered with an unbalanced E1 interface, the RJ-45 connector is converted to the standard pair of unbalanced E1 BNC female connectors. For this purpose, RAD offers a 150-mm long adapter cable, CBL-RJ45/2BNC/E1/X, wired in accordance with *Figure A-1*.

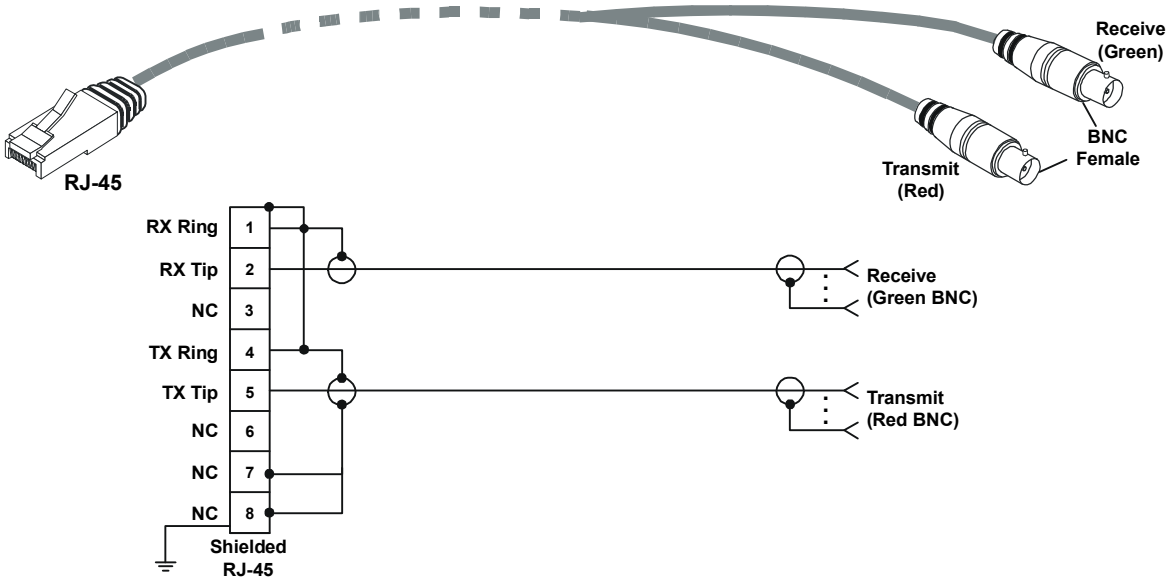


Figure A-1. CBL-RJ45/2BNC/E1/X Cable Wiring Diagram

A.2 Ethernet MNG and USER Connectors

The pin assignment of the MNG and USER Ethernet RJ-45 connectors is listed in *Table A-2*.

Table A-2. Ethernet Connector Pinouts

Pin Number	Pin Name	Pin Description	Direction
1	TXP	TX Data Positive	Output
2	TXN	TX Data Negative	Output
3	RXP	RX Data Positive	Input
4	NC	Conncted to GND via 75 ohm resistor and 1000PF/2KV capacitor	
5	NC	Conncted to GND via 75 ohm resistor and 1000PF/2KV capacitor	
6	RXN	RX Data Negative	Input
7	NC	Conncted to GND via 75 ohm resistor and 1000PF/2KV capacitor	
8	NC	Conncted to GND via 75 ohm resistor and 1000PF/2KV capacitor	

A.3 Alarm Connector

The Optimux-34 ALARM connector is a 9-pin female connector, which includes three contacts for each of the alarm relays. *Figure A-2* shows the pin functions. The relay positions are shown in the non-energized (alarm active) state.

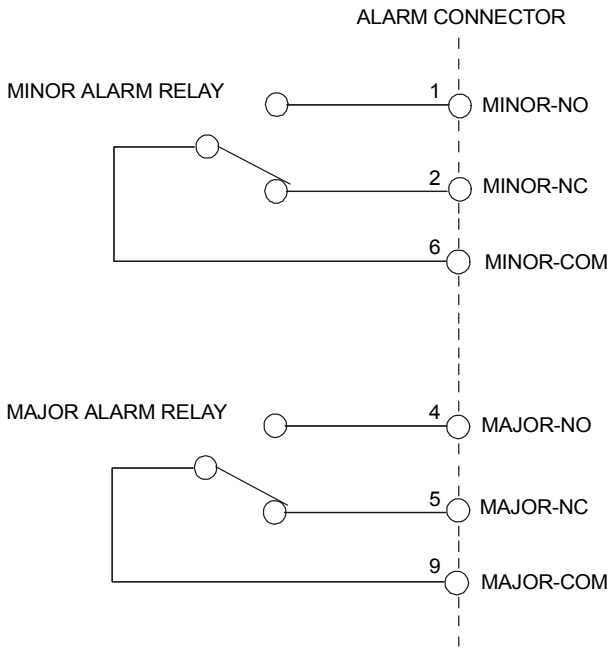


Figure A-2. Alarm Connector Wiring

The pin assignment of the Alarm connector is depicted in *Table A-3.*

Table A-3. Dry Contact Alarm Connector Pin Assignment

Pin Number	Pin Name	Pin Description
1	MINOR alarm Normally Open	Connected to Pin 6 when Minor alarm is OFF (MINOR alarm relay is active).
2	MINOR alarm Normally Closed	Connected to Pin 6 when Minor alarm is ON (MINOR alarm relay is not active).
3	No Connection	Unused
4	MAJOR alarm Normally Open	Connected to Pin 9 when Major alarm is OFF (MAJOR alarm relay is active).
5	MAJOR alarm Normally Closed	Connected to Pin 9 when Major alarm is ON (MAJOR alarm relay is not active).
6	MINOR alarm Common Pin	See Pin 1 and 2 descriptions.
7	No Connection	Unused
8	No Connection	Unused
9	MAJOR alarm Common Pin	See Pin 4 and 5 descriptions.

The pin assignment of the Terminal connector is listed in *Table A-4.*

Table A-4. Terminal Connector Pin Assignment

Pin Number	Pin Name	Pin Description	Type (Input/Output)
1	NC	Not connected	
2	TXD	TXD Data to Terminal	Output
3	RXD	RXD Data from Terminal	Input
4	NC	Not connected	
5	GND	Ground	GND
6	NC	Not connected	
7	NC	Not connected	
8	NC	Not connected	
9	NC	Not connected	

A.4 Control Connector

The optional RS-232 control port has a standard ITU-T V.24 DCE interface. The physical interface is a 9-pin female connector, designated CONTROL/MNG.

A.5 Power Connectors

The power connector used for AC powering is a standard square 3-prong female connector.

A.6 V.35 Connectors

The pin assignments for the V.35 connector (DB-25) are listed below.

Table A-5 lists the V.35 interface that supports ISO-2110 pinout.

Table A-6 lists the V.35 interface that supports Telebras pinout (ordering option).

Table A-5. V.35/ISO-2110 Pinout

Pin Number	Pin Name	Pin Description	Type (Input/Output)
1	GND	Ground	GND
2	TDA	Transmit data A	Input
3	RDA	Receive data A	Output
4	RTS	Request To Send	Input
5	CTS	Clear To Send	Output
6	DSR	Data Set Ready	Output
7	GND	Ground	GND
8	DCD	Data and Carrier Detect	Output
9	RXCB	Receive clock B	Output
10	NC	Not connected	
11	EXTCB	External clock B	Input
12	TXCB	Transmit clock B	Output
13	NC	Not connected	
14	TDB	Transmit data B	Input
15	TXCA	Transmit clock A	Output
16	RDB	Receive data B	Output
17	RXCA	Receive clock A	Output
18	LLB	Local Loopback	Input
19	NC	Not connected	
20	DTR	Data Terminal Ready	Input
21	RLB	Remote Loopback	Input
22	NC	Not connected	
23	NC	Not connected	
24	EXTCA	External clock A	Input
25	TEST_MODE	Test Mode	Output

Table A-6. V.35/Telebras Pinout

Pin Number	Pin Name	Pin Description	Type (Input/Output)
1	GND	Ground	GND
2	TDA	Transmit data A	Input
3	TXCA	Transmit clock A	Output
4	RDA	Receive data A	Output
5	RTS	Request To Send	Input
6	RXCA	Receive clock A	Output
7	CTS	Clear To Send	Output
8	LLB	Local Loopback	Input
9	DSR	Data Set Ready	Output
10	DCD	Data and Carrier Detect	Output
11	EXTCA	External clock A	Input
12	TEST_MODE	Test Mode	Output
13	GND	Ground	GND
14	NC	Not connected	
15	TDB	Transmit data B	Input
16	TXCB	Transmit clock B	Output
17	RDB	Receive data B	Output
18	NC	Not connected	
19	RXCB	Receive clock B	Output
20	NC	Not connected	
21	NC	Not connected	
22	NC	Not connected	
23	RLB	Remote Loopback	Input
24	EXTCB	External clock B	Input
25	NC	Not connected	

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Customer Response Form

RAD Data Communications would like your help in improving its product documentation. Please complete and return this form by mail or by fax or send us an e-mail with your comments.

Thank you for your assistance!

Manual Name: Optimux-34 Ver. 2.81

Publication Number: 326-200-03/09

Please grade the manual according to the following factors:

	Excellent	*Good*	*Fair*	*Poor*	*Very Poor*
Installation instructions	☐	☐	☐	☐	☐
Operating instructions	☐	☐	☐	☐	☐
Manual organization	☐	☐	☐	☐	☐
Illustrations	☐	☐	☐	☐	☐
The manual as a whole	☐	☐	☐	☐	☐

What did you like about the manual?

_____

_____

_____

_____

Error Report

Type of error(s) or problem(s):

- ☐ Incompatibility with product
- ☐ Difficulty in understanding text
- ☐ Regulatory information (Safety, Compliance, Warnings, etc.)
- ☐ Difficulty in finding needed information
- ☐ Missing information
- ☐ Illogical flow of information
- ☐ Style (spelling, grammar, references, etc.)
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